Vol. II. August, 1895. No. 8.

THE VETERINARY MAGAZINE

A JOURNAL FOR THE PRACTITIONER, AND FOR THE ADVANCEMENT OF COMPARATIVE MEDICINE.

EDITED AND PUBLISHED MONTHLY BY

Simon J. J. Harger, V. M. D., Leonard Pearson, V. M. D., John W. Adams, V. M. D.

WITH THE CO-OPERATION OF

C. A. CARY, D. V. M., Ala. Exp. Station.
DR. ALEXANDER GLASS, Lecturer on Theory and Practice Canine Med. U. of P.
JOHN GUITERAS, M. D., Prof. of Pathology, Univ. of Pa.
T. D. HINEBAUCH, V. S., Agricultural Exp. Station of North Dakota.
W. HORACE HOSKINS, D. V. S., Pres't U. S. Vet. Med. Ass'n.
JOSEPH HUGHES, M. R. C. V. S., Prof. Vet. Anat. etc., Chicago Vet. Coll.
JAMES LAW, F. R. C. V. S., Prof. Vet. Science, Cornell University.
A. LUNGWITZ, District Vet., Director Shoeing School of Royal Vet. School, Dresden.
C. C. LYFORD, M. D., D. V. S., Minneapolis.
DR. H. MÖLLER, Prof. of Surg., Royal Vet. School, Berlin.
DR. I. MUNK, Prof., University, Berlin.
W. B. NILES. D. V. M., Prof. Vet. Surg., Iowa Vet. Coll.
F. H. OSGOOD, M. R. C. V. S., Prof. Operat. Surg., etc., Harvard Vet. School.
E. O. SHAKESPEARE, M. D., Phila.
DR. C. SHUETZ, Prof. at Royal Vet. School, Berlin.
A. S. WHEELER, V. M. D., Meat and Cattle Inspector, New Orleans Board of Health.
HORATIO C. WOOD, M. D., Prof. Therapeutics, Univ. of Pa.
DR. N. ZUNTZ, Prof. at the Imperial Agr. School, Berlin.

...Table of Contents...

ORIGINAL ARTICLES. PAGE.

The Therapeutics of Colic, By W. L. Williams, ... 457
An Improved Method of Plantar Neurectomy, By M. H. McKillip, ... 472
The Horse as a Producer of Antitoxins, By Olaf Schwarzkopf, ... 474
Physical Diagnosis, By Jacob Helmer, 479
Serum Therapeutics, S. J. J. Harger, . 492
Parasitic Ictero-Hematuria of Sheep, By W. L. Williams, ... 497

EDITORIALS. PAGE.

The United States Veterinary Medical Association, etc., ... 505

TRANSLATIONS.

Neurectomy: Indications and Contra-Indications, By FRICK, ... 507
Animal Diphtheria, By DR. LÉON GALLEZ, ... 509

COMMUNICATION.

Posology of Belladonna and Its Alkaloid in Sialorrhea, By E. S. Muir, . . 517

PRICE, $3.00 A YEAR IN ADVANCE,

Single Copies, 30 cents.

All communications and payments should be addressed to the "VETERINARY MAGAZINE," 3608 Pine Street, Philadelphia, Pa.

LCOME INSTITUTE
LIBRARY
WelMOmec

Some of the New or Revised

VETERINARY BOOKS,

PUBLISHED BY

WILLIAM R. JENKINS,

48th Street and Sixth Avenue,
851 and 853 Sixth Avenue,

NEW YORK.

HORSES: In Accident and Disease. Notes and Sketches. By J. ROALFE COX, F.R.C.V.S. 8vo, cloth, 28 full page illustrations, $1.75 net; to *Veterinarians and Students*, $1.40.

The author has, from custom and early association with the veterinary profession, preserved sketches of prominent signs of suffering in horses, so many of their ailments being forcibly expressed in peculiar attitudes. The drawing of subjects brought together in this volume will, it is hoped, be especially useful to the student in illustrating his reading, and, at the same time, will not be without interest to all who are concerned in the welfare of the horse. The sketches introduced embrace various attitudes which have been observed, such as in choking; the disorders and accidents occurring to the stomach and intestines; affections of the brain; and some special forms of lameness, etc., etc

ROARING IN HORSES: Its Pathology and Treatment. By P. J. CADIOT Professor at the Veterinary School, Alfort. Translated from the original by THOMAS J. WATT DOLLAR, M.R.C.V.S., G.B., Lec. Vet. Med. and Surg. H.A.S.S. Cloth, completely illustrated with full page plates, 90 cents net; to *Veterinarians and Students*, 72 cents.

This work represents the latest development in operative methods for the alleviation of roaring. The investigations were carried on in a thoroughly scientific manner, and each step is most clearly defined by excellent full page illustrations.

A MANUAL OF VETERINARY PHYSIOLOGY. By Veterinary Captain F. SMITH, M.R.C.V.S. Author of "A Manual of Veterinary Hygiene." 8vo, cloth, fully illustrated, $4.25 net; to *Veterinarians and Students*, $3.40.

This work is distinctive from any other on the subject known to the profession, it being exclusively a Veterinary and not a Comparative Physiology.

STRANGEWAY'S VETERINARY ANATOMY. Revised and edited by I. VAUGHAN, F.L.S., F.R.S. Fourth American Edition, 8vo, cloth, with several hundred illustrations, $5.00 net; to *Veterinarians and Students*, $4.00

The work has been very carefully read and considered. The diction has occasionally been improved, and a few alterations made in the nomenclature where such appeared necessary.

VETERINARY MEDICINES, Their Actions and Uses. By FINLAY DUN. 8th edition revised and enlarged (almost entirely rewritten). 776 pages, 8vo, cloth, $5.00 net; to *Veterinarians and Students*, $4.00.

The increased bulk of the present volume results from the introduction of the recently discovered antiseptics and antipyretics of the benzol series, and other new remedies; from details of various British and foreign experiments made with alkaloids and other medicines; and from fuller and more systematic treatment of the actions of various important drugs. Careful revision has been made of the matter relating to the actions on the several domesticated animals, the curative uses, doses and medical forms. The Index of Diseases and Remedies has been considerably enlarged, and an endeavor has been made to indicate the nature of each disease, the conditions which dictate the use of particular remedies, and the manner in which they relieve or cure.

HOW TO JUDGE A HORSE. A guide for Amateurs. By CAPTAIN F. W. BACH, 12mo, cloth, fully illustrated, $1.00 net; to *Veterinarians and Students*, 80 cents.

Everybody loves a horse. Everybody ought to study its conformation. Every purchaser knows by experience how difficult it is to arrive at correct conclusions as to its *soundness and qualities*.

Unlike many valuable books on the exterior of the horse, *this little treatise has the advantage of great conciseness* in pointing out, in few pages, the most important guiding points for the judging, and some points on methods of training young or obstinate horses are added, as it may become necessary for the owner to break in his young stock himself or correct those having formed bad or dangerous habits, especially if living in the country with nobody near capable of handling young or obstinate horses.

A few remarks, concerning how to handle the reins properly in driving, may be of interest to some of the readers. Also bits and bitting, saddles and saddling, and stable drainage are considered.

All horse owners or persons intending to purchase a horse should read this work.

NEW REVISED EDITION OF

HORSES' TEETH. A Treatise on their Mode of Development, Anatomy, Microscopy, Pathology and Dentistry; Compared with the teeth of many other Land and Marine Animals, both Living and Extinct; with a Vocabulary and copious extracts from the works of Odontologists and Veterinarians. By WILLIAM H. CLARKE, 12mo, cloth, illustrated, $2.50.

New books and revised editions of old publications are in course of publication, so, if veterinarians or students are desirous of keeping up to the times, it would be well to send in their names for new catalogues and circulars.

Complete Catalogue will be sent on application. All of our books may be obtained from your nearest bookseller or will be sent direct on receipt of price.

WILLIAM R. JENKINS,

PUBLISHER AND IMPORTER OF VETERINARY BOOKS,

48th STREET AND SIXTH AVENUE,
851 and 853 SIXTH AVENUE,

NEW YORK.

THE
VETERINARY MAGAZINE.

VOL. II. AUGUST, 1895. No. 8.

THE THERAPEUTICS OF COLIC.[1]

BY W. L. WILLIAMS,
Veterinarian to the Agricultural Experimental Station, Bozeman, Mont.

The term colic has been made to include a variety of diseases of the abdominal organs, due to widely dissimilar causes and possessing but one common character, that of abdominal pain having its origin in some portion of the digestive canal.

This grouping of a number of diseases under one term is partly necessary, because many of them cannot be clearly differentiated during life, although each has characters in a measure peculiar to itself, which may lead to a probable or even positive diagnosis.

Statistics indicate that 10 to 20 per cent of horses affected with colic die, and that 40 per cent of the deaths of horses are due to this affection. These statistics appear to be largely from city districts, and, hence, apply to work horses. In breeding districts these figures are probably entirely too high.

The difficulty of safely identifying the various diseases of this group tends unconsciously to lead to the empirical treatment of the entire group by a common formula, regardless of specific indications offered by each individual case. Under these conditions we find the treatment of colic unsatisfactory.

The Munich Veterinary School (Friedberger & Fröhner, Lehrbuch d. Spec. Path. u. Therap., Vol. I, p. 162) has shown that an apparently greater per-cent of colic cases recover without than with medication. Have we not permitted empiricism to displace rational medicine to an unjustifiable degree?

The conclusions of the Munich Veterinary School are applicable to several veterinary colleges in our country and to the practice of many veterinarians.

[1] Read before the United States Veterinary Medical Association, 1895.

During my first years in practice, when I followed trustingly the methods dictated by authors and teachers, my losses from colic were appalling, costing me many anxious hours and valued patrons; but as necessity and reason drove me farther and farther from what I thought classic methods, and taught me a higher appreciation of nature's powers and her abhorrence of unnecessary meddling in disease, my losses became very much less.

If we are to handle colic without violence to natural methods, we must apply to it greater knowledge and judgment than to any other internal malady. The confusion in its treatment is shown by the endless number of remedial agents used without any apparent order. One will have the patient lie, another stand, another walk or trot or run.

One relies on anesthetics, another on sedatives, another on stimulants or carminatives, another upon astringents, and others upon laxatives or purgatives. Not a few combine several or many of them in inextricable confusion, or give together two diametrically opposite drugs, as opium with oil or aloes in such proportions as to partly or wholly counteract each other.

Among the diseases grouped under the common head, colic, because they are not always distinguishable from each other, we must recognize, for therapeutic reasons, numerous pathological conditions due to various causes, among which are:

1. Dietetic colic.

(*a*) Overfeeding colic.

(*b*) Colic due to damaged or improperly prepared food.

(*c*) Starvation colic.

2. Obstruction colic.

(*a*) Impaction colic, including the impaction of dry woody food in the large intestines of adults, the retained meconium or ingested straw or hay of young foals, and the gummy feces occasionally seen in horses at pasture or eating green grass.

(*b*) Mechanical obstruction.

(1) Volvulus.

(2) Intussusception.

(3) Hernia.

(4) Tumors.

3. Colic due to paralysis of the intestines.

4. Colic due to the interruption of the gastro-intestinal blood supply.

(*a*) Thrombosis.

(*b*) Embolism.

5. Reflex nervous colic, due to exposure, fatigue and other causes—spasmodic colic.

6. Colic due to external mechanical pressure or to abnormal position of the body.

7. Worm colic.

8. Colic due to foreign bodies in the intestinal canal.

(*a*) Calculi.

(*b*) Sand or dirt.

The application of rational therapeutics to this group of pathological conditions renders it necessary that our first law shall be to rigidly avoid the use of any medical agency which would tend to aggravate any pathological condition present, whether recognizable or not, or to pursue, as far as possible, an expectant line of treatment.

In the colic of overfeeding, with its history, we have no cause to suspect any obstruction, but have to deal with an overloaded gastro-intestinal canal, the contents being moist, soft and tending to rapid decomposition with the formation of large quantities of gases, with the consequent dangers of gastro-intestinal ruptures, suffocation, intestinal paralysis, gaseous poisoning and other untoward results.

The chief and most urgent element of danger is the gaseous accumulations from which relief should be given as promptly as practicable for many reasons.

1. To avoid rupture of the stomach, intestines or diaphragm.

2. To prevent suffocation.

3. To prevent toxic effects from the absorption of gases.

4. To permit normal peristalsis and avoid gastro-intestinal paralysis.

5. To relieve pain.

6. To prevent intestinal displacement.

The use of the trocar for relieving gaseous distention is so prompt, efficacious and safe that no apology is necessary for mentioning this method almost alone. In order to fully accomplish all the purposes indicated above, the use of the trocar is demanded as early as any appreciable degree of tympany is present, and its repetition as often as like conditions return.

The gaseous accumulations are generally most pronounced in the large colon and cecum, and we usually aim to enter these with the trocar; the point usually selected for the operation is the highest part of the right flank in which position, if the animal be standing, the gas is most free from admixture with food and consequently flows most freely through the cannula. If the patient is lying down the intestines are quite probably displaced somewhat, but most likely the most distended intestine occupies the highest point of the abdominal cavity, whether that be the middle or lower region of the flank, right or left side.

There has been an endless variety of trocars invented, the simplest being distinctly the best. The caliber of the trocar usually kept for sale is too great, being ⅛ inch or more in diameter, while $\frac{3}{32}$ inch is ample and adds to the safety by decreasing the area of the wound about one-half. This reduction in size necessitates the use of the best of steel, well tempered that it will not bend. The point of the trocar should be far more tapering, the sharp part being two or three times as long as in those generally offered and delicately sharpened so that its use occasions an incised and not a punctured wound. The cannula should fit the trocar closely and perfectly, leaving no space between them, and the end of the cannula should be well rounded and smooth so that no foreign matter can be lodged between the end of it and the trocar and carried into the tissues, nor the peritoneum nor intestine caught and pushed along before the cannula. The trocar should be fastened immovably in the handle. Reversible trocars cannot be kept in order, their points being dulled by contact with the handle when reversed.

If the instrument is to be carried in the pocket it should be supplied with an appropriate case. A very serious defect in the construction of most reversible instruments is the making of the trocar too short for the cannula, so that when used the set-screw fails to hold it in place, allowing it to push back into the handle so far that the point is partly hidden within the cannula, allowing the end of the latter to tear and abrade the tissues, marring or wholly preventing a successful operation. The minimum net length of cannula should be six inches, and even this will be found short for very fat heavy-draft horses. If too short, the gut slips off the end very readily either from

peristaltic movement or collapse of engaged portion. Besides, it may be necessary to pass through one intestine and enter another portion. Before using it, the trocar should be carefully sterilized and, when practicable, the part to be subjected to the operation should also be cleansed, although this is not generally so important, for if the trocar be properly made as described it cannot well drag foreign matter far into the tissues. The incision of the skin at the point of operation, by means of a lancet, is unsurgical, producing a larger and more open wound than that caused by the trocar, through which infection may more readily occur. The skin serves as an important bulwark against septic infection, and should be left as nearly intact as practicable, which is best done by using the small trocar with its sharp, well-tapered point, which cuts like a lancet and leaves when withdrawn a wound almost undiscoverable. The trocar should be held loosely in one hand, perpendicular to the abdominal walls, and its insertion accomplished by a quick stroke with the palm of the other hand, driving it to its desired depth at a single blow.

The trocar is then withdrawn and the cannula retained in position with the hand, being careful to prevent its dislodgement from the intestine by peristaltic action. After the gas has escaped, the trocar should be reinserted into the cannula, so that on withdrawal the intestinal walls catch and wipe off any ingesta which might otherwise adhere to the mouth of the cannula, and drop into the peritoneal cavity or lodge in the abdominal walls. More abscesses and septic inflammations are probably due to drawing septic material from the intestine and depositing it in the tissues than are caused by the introduction of septic material from without. Should the escape of gas be unsatisfactory, the depth of introduction may be varied by placing the trocar within the cannula and pressing it forward or drawing it outward. Frequently it is found that a small amount of gas escapes from the intestine when first punctured, then it collapses and the pressure of other portions of the intestine is such that the portion encountered does not refill. In such a case the collapsed part of the bowel is to be passed through and distended portion entered. If success is wanting on the right side, there should be no hesitation in trying the left. Fatal sequelæ from the use of the trocar have been recorded, but I have not observed them. In one case I produced

peritonitis of a severe type, owing to too short a cannula from which the intestine repeatedly slipped and probably caused the lodgment of intestinal contents into the peritoneal cavity. In another case a very serious abscess formed in the abdominal walls which finally ruptured in the inguinal region. In this case the instrument was used in the dark, and the horse was thickly smeared with wet manure at the point of operation, the case being one of unusual urgency. Several times small abscesses have followed the use of the trocar, but they were insignificant and did not interfere with the daily work of the patient.

It has been suggested that, when the stomach is the seat of considerable gaseous distention, as evidenced by attempts at vomition and eructations of gas, it should be attempted to introduce the trocar into this organ, and it has been claimed that this operation has been successfully performed by the use of an extra long trocar introduced at the usual point for entering the colon or cecum, the practicability of the operation being explained upon the theory that when distended with gas the stomach turns on its longer axis and floats upwards.

But in autopsies which I have conducted after rupture of the stomach that organ was found in its normal position, and the position of its former contents in the peritoneal cavity indicated clearly that its position had been constant. It is rare, however, that the stomach requires direct relief from gaseous distention, as the gases are most frequently formed in the intestines and pass forward into the stomach, or being formed in the stomach pass readily backward into the intestine until the colon is reached.

The stomach does not rupture because the gas within it is under greater pressure than in other parts of the alimentary canal, but because of the much greater surface upon which the gaseous pressure is exerted at the same rate per unit of surface. If the colon be relieved by the use of the trocar, the stomach is immediately relieved also in nearly all cases. At least, I have not observed rupture of this organ in any case where the colon was kept free from gaseous accumulations. Should emptying of the colon fail to relieve the gastric distention the stomach tube may be found useful.

When the tympany has been relieved with the aid of the trocar the chief element of urgency has been overcome, and the

pain and discomfort of the animal has been markedly alleviated, and the attendant has time to proceed deliberately and carefully. The patient should be made as comfortable as possible, a good, deep bed of straw provided, upon which, if it will lie down, it should be allowed to rest as quietly as possible. If very restless and not exhausted, slow walking sometimes allays the uneasiness and tends to hasten the evacuation of the bowels. The patient should be prevented from throwing himself violently on the ground. Hot fomentations, poultices, brisk rubbing or the application of stimulating liniments to the abdominal walls may be of value. If the pain present demands it, the remedies to be administered should be so selected that while alleviating the pain they should not interfere with the normal secretion or peristaltic motion of the alimentary canal, and that they should as far as possible check further decomposition of food and the consequent gaseous accumulations. Opium and morphine are both clearly contra-indicated, as they serve to constipate and paralyze the bowels and augment the gaseous distention.

Turpentine and camphor relieve the pain fairly well, but are too prone to irritate.

Carminatives, such as ginger, anise seed, and peppermint, exert a wholesome influence by stimulating the normal action of the bowels, especially when combined with alcohol or its derivatives, such as nitrous ether, these latter possessing, in addition to their anti-spasmodic properties, a distinctly anti-ferment action. Chloral hydrate claims here a very important place, being markedly antiseptic, yet anodyne in a high degree. Chloral has the disadvantage that after a full dose, especially in solution, it is dangerous to follow the drug soon after with a drench, as the chloral so benumbs and anesthetizes the throat and larynx that swallowing is afterward imperfect, and the medicine drops into the larynx and passes into the lungs, producing foreign-body pneumonia and more frequently in my observation, acute lung apoplexy, ending fatally in one to a few hours. Some writers, among them Finlay Dun, state that chloral may be safely administered hypodermically; but from some three exceedingly unfortunate attempts to use the drug in this way, in which extensive gangrene of the subcutaneous connective tissues ensued in each case, disabling the patient for several weeks, I became convinced that the drug was not usable in this manner. Again I have tried administering the

drug in the dry form, wrapped in paper, but the paper may break in the mouth or fauces and cause painful excoriations, or may lodge in the esophagus and cause inflammation of that organ, producing symptoms of choking. In one case, I was called fifty miles in consultation in a supposed case of choking, only to find on my arrival that the esophagus had been burned by the lodgment of the chloral pill. It is therefore best to give chloral in small, soft tenacious pills, which will not readily break, cannot lodge in the esophagus, and once in the stomach, will quickly melt.

An important question confronting the veterinarian is the action to be taken regarding the presence in the intestinal canal of the superabundance of food.

Generally purgatives are resorted to as the rational treatment indicated. But a careful study of the conditions presented and observation with the various methods of treatment demonstrate this to be erroneous.

The ordinary purgatives act too slowly in the horse, so that ere purgation ensues the crisis has been safely passed, and if let alone the bowels will move gently or undergo slight diarrhea.

In those cases of over-feeding, with flatulence, the bowels have been distended, more or less paralyzed and usually irritated or inflamed. A full dose of aloes under these conditions means that it cannot act until the colic ceases, or rather until the time when naturally the colic should cease, when in the weakened state of the bowels the colicky pains are renewed by the drastic action of the aloes, and when the bowels finally respond they do too violently, not infrequently ending in the death of the animal, quite commonly delaying the return of the horse to his accustomed duties for several days. In other cases aloes remains in the system for a long time causing great depression and in some cases fatal aloes poisoning, without showing any tendency to purgation. The bland oils, while doing little if any good in these cases, do comparatively little harm, but the already overloaded stomach can certainly profit but little by their introduction.

I have noted also, that when oil has been given and yet remains in the stomach, that with pills wrapped in paper and entering the stomach filled with oil, the wrappers become oiled and the pill is not dissolved for several hours.

In this way I have seen chloral pills repeated several times without effect, until finally the oil has been absorbed and then the combined effects of several large doses of chloral were manifested at once.

Other purgatives, such as glauber salts, tartar emetic and calomel, have been commended and are probably safer than aloes or oil, although their value may well be doubted.

More recently, pilocarpine and eserine have come into prominence as remedial agents in this affection, and like most new remedies have been much abused and have tended to relapse into disuse.

If eserine has a place in veterinary medicine it is certainly in the disease. The food is generally soft, and needs only prompt peristaltic action to cause its expulsion from the alimentary canal, and eserine can furnish this. Friedberger and Fröhner fear that in the over-filled condition of the stomach and bowels the severe muscular contractions are likely to produce rupture. This would doubtless be true in cases of mechanical obstruction such as volvulus; of inflammation with consequent paralysis of a section of intestine; of impaction with hard dry food, or in the presence of great accumulations of grass. The mechanical obstructions we rarely suspect in cases where a clear history of over-feeding exists; the impaction with hard dry feces, rarely, if ever, occurs in these cases; the inflammation and paralysis of section of the bowel usually takes place only after several hours' duration of the disease, while the gaseous distention is subject to our control by surgical means. We therefore see no direct danger in the use of eserine in the earlier stages of this affection if the gaseous distention be first relieved by the use of the trocar. I think it better to give small, repeated doses of one-half to one grain rather than one large dose. More recently still our attention has been called by Prof. Dickerhoff to the use of barium chloride as a purgative for the horse, and much is claimed for it in promptness, efficacy and safety, although its advantage over eserine, except in cost, is not very clear. It must be constantly borne in mind that purgatives are unnecessary in this affection, and that unless their use be very judicious they do more harm than good.

I long since abandoned almost entirely the use of purgatives in colic from over-feeding, and can say that my success has been far better than under the usual regime. With the abandonment

of purgatives, opium and morphine have, as already implied, also been discarded. If morphine is used, purgatives may be necessary to overcome its effects, but they are not essential in combating the disease. I would then say, if purgatives are to be given, use them only in the very early stages in absence of great gaseous distention, and select preferably eserine. If purgatives have not been used, we frequently find, after the crisis of the disease has passed or even during the early stages, a more or less severe diarrhea, which must not be checked but merely watched and controlled. Demulcent gruels, stimulants and carminatives will nearly always suffice, and when the feces are very fetid salol should be added.

In colic due to the indigestion of musty or otherwise unwholesome food, leading to its early decomposition within the alimentary canal, we generally find a degree of tympany which necessitates the early and repeated use of the trocar. Our efforts should next be directed toward staying the fermentation of the intestinal contents by the administration of antiseptics, anti-ferments, diffusible stimulants and carminatives; salol and possibly napthalin should prove highly useful during the disease as well as during convalescence.

Opium is clearly contra-indicated, as it serves only to stop the peristaltic action of the bowels and the secretion of digestive fluids, thus encouraging the decomposition of the food which constitutes the essential factor in the disease. Hepatic stimulants, by increasing a flow of bile, stimulate healthy peristalsis and render the intestinal contents aseptic.

In the latter stages and frequently early in the disease there is a marked tendency to diarrhea which should be combated by demulcent gruels, carminatives and diffusible stimulants. In colic due to a prolonged deprivation of food we frequently find co-incidently fatigue. Opium and morphine are rarely, if ever, indicated, but rather carminatives and diffusible stmulants, such as aromatic spirits of ammonia, ginger, alcohol and nitrous either, in the form of a drench, with large volumes of warm water or gruel.

The patient should be kept as quiet and comfortable as possible. Heat applied to the abdomen by means of hot wet blankets may afford much relief. Purgatives are clearly inadmissible.

In the colic of impaction in adult horses, due to the ingestion of food composed too largely of woody fibre, we are confronted

with conditions requiring much time and not infrequently great tact to be removed. There is plenty of time and we need not hasten. Purgatives are almost universally prescribed, but the very drastic members of the class, such as croton oil, gamboge, eserin and pilocarpin, are clearly contra-indicated and we must rely rather upon those cathartics which will slowly and gently soften and render pultaceous the accumulated dry mass when little, if any, stimulation to the peristaltic action will accomplish its expulsion. The impaction generally occurs too far forward to render enemata of avail. Aloes serves the purpose fairly well, but large and repeated doses of the bland oils are better, and better still perhaps, one moderate dose of aloes combined with oil, the latter to be repeated frequently. The formation of gases rarely occurs. The pain is seldom severe and but rarely calls for remedial treatment.

When relief from pain becomes necessary, aconite, belladonna or cannabis indica should be used, and if used with great caution, morphine may be employed in doses of one-third to one-half grains subcutaneously, as in these does it is not constipating.

In newly-born foals we frequently meet with obstinate colic, the result of retained meconium or a little later due to the ingestion of hay or straw. In these cases, while large doses of bland oil may naturally aid, enemata of warm water or oil constitute the most reliable remedial measures. By fitting the nozzle of a bulb syringe into an ordinary gum horse catheter the latter can be slowly and carefully introduced up into the obstructed bowel, the water or oil being all the time slowly introduced. In this way the catheter becomes insinuated between the fecal mass and intestinal walls, following the flexures of the intestine the full length of the catheter and permits the fluids to mingle with and soften the hard mass so that it readily passes away.

Repeated enemas for several days or even a week may at times be necessary, the foal in the meantime being muzzled if needed to prevent the further ingestion of indigestible matters. In these, the colic is rarely so acute as to warrant anodyne remedies. In that form of colic due to obstruction of the rectum of young animals at pasture by gummaceous feces, the cause of which we do not understand, the eversion of the rectum generally attracts more attention than the accompanying colic. It

is to be remedied by the manual removal of the gummy feces, aided by enemas of warm water, and its recurrence prevented by a change in diet.

The colic of intestinal paralysis is closely allied to that of impaction in many cases, but calls for a rather more delicate judgment in its treatment.

When paralysis is due to a want of general tone in the animal, the result, most frequently, of inactivity and high feeding, we generally need only to wait, which is frequently about the most difficult of all courses to pursue, especially if the owner be present. Purgatives must necessarily increase the danger of the disease. Oleaginous laxatives and demulcents, by softening the intestinal contents, tend to relieve the malady. The pain is rarely extreme and should when necessary be controlled by such remedies as will not interfere with normal intestinal functions. Small laxative doses of morphine frequently act nicely, relieving the pain and tending to overcome the disease. In one of my cases of a heavy draft mare in high condition and idle, one-half gr. doses of morphia repeated two or three times daily, controlled the colic perfectly, and on the sixth day, without other medication, the bowels moved normally, and recovery was complete without purgation, while purgation would probably have led to superpurgation with unfavorable results. In fact, my observations of the use of morphine in intestinal paralysis suggest strongly its use in severe impaction.

The treatment of volvulus and intussusception, from the difficulty of exact diagnosis, must be unsatisfactory. In the present state of our knowledge it should be practicable, where positive diagnosis is possible, to give relief surgically. In cases where it is suspected and surgical correction not undertaken, only palliative means are to be attempted, such as the relief of pain, prevention of gaseous distention and abstention from purgatives. There is much variation in views as to the causation of these displacements, some ascribing them to the irregular muscular contractions of colics, others to the contractions induced by purgatives, and others, in cases of volvulus, to the rolling of the animal during the agony of colic. The important point to consider in our present theme is the possibility of producing or preventing it during our care of a colic patient. Volvulus is largely attributed by writers to violent rolling, but strangely enough, apparently occurs most

frequently, according to statistics furnished by these writers, where the rolling is prevented as far as practicable, so that others, notably Friedberger and Fröhner, in whose opinion I concur, think this had been brought into great prominence. In fact, rolling is quite as likely, I think more likely, to correct such displacements than to cause them.

In a practice of sixteen years without recorded numbers, but perhaps light in colics, in which I have habitually made post-mortem examinations when practicable, I have found but one case of volvulus. It involved the entire ceco-colic mass in which case, from the history and symptoms, the displacement must have occurred prior to symptoms of colic, and the rolling certainly had nothing to do with it. Of intussusception I have observed three cases, one in the adult affecting the small intestine, the history unknown, probably antedating the colic, and not due to purgatives; the other two were ileo-cecal in young foals, cases which I have already recorded, due to thrombo-embolic colic, resulting from the presence of the strongylus armatus in the mesenteric arteries. Friedberger and Fröhner refer to this as a common cause of intussusception. From all the evidence at hand it seems improbable that intussusception is caused by rolling, nor can we believe, by regular contractions due to purgatives. It seems probable that it is due to irregular intestinal contractions such as exist to a degree in colic, and more perhaps in colic interfered with by injudicious doses of morphine, combined with purgatives.

I believe it quite rational to assume that such irregular contractions would ensue when colic is interferred with by conflicting treatment, by giving two remedies, like opium and aloes, the one in paralyzing doses the other in doses to excite peristalsis. This precaution, with as nearly perfect freedom of the patient as possible and care to prevent gaseous accumulation, we believe, will do all that is possible to avoid the dangers from these accidents.

In hernia and pressure from tumors we must rely upon surgical interference, but these operations may be made easier, safer, and in cases only possible by the previous use of narcotics or anesthetics.

In colics due to thrombi or emboli we have an obstruction to the blood supply which must be relieved by the establishment of sufficient collateral circulation before recovery can take

place ; our treatment is purely expectant, and the result must depend upon the success or failure of the required collateral circulation before fatal lesions have occurred in the affected parts. We must rely upon those remedies which relieve the pain, without interfering markedly with peristalsis, although in most cases it may be safely diminished for a time. Morphine in small or medium doses is indicated unless tympany is present, in which case it should give way to cannabis indica or chloral, alcohol and nitrous ether, the gaseous accumulations being studiously relieved by the use of the trocar. Purgatives are clearly inadmissible.

In spasmodic colic while carminatives, stimulants, sedatives and other classes of remedies relieve in many cases, morphine certainly comes most rationally into use as the chief remedial agent, and it may be pushed to a very considerable degree. It should be constantly borne in mind, however, that *morphine is not soporific in solipeds, but, on the other hand, in large doses is uniformly and dangerously excitent*, as has been pointed out by Guinard (*Jour. de Méd. Vét. et de Zoötechnïe*, July, 1893,) so that it must be used cautiously and not pushed beyond the degree needed for the alleviation of pain. No remedy is so misused and its actions so misunderstood by veternarians as is opium, and its chief alkaloid, morphine. We are generally taught that it is soporific and depressant in a horse. But when the veternarian makes too great haste to relieve pain by its use, the horse becomes excited, nostrils dilated, eyes staring, tail elevated, and the patient becomes uncontrollable, a victim of opium poisoning, while the improperly taught veterinarian tries to overcome this excitation by larger doses, adding more to the difficulty, finally ending in fatal opium poisoning ; and the veterinarian is left wondering why his morphine would not quiet the patient. Not long since I read the communication of a layman of how the veternarian in his locality habitually lost all colic cases because morphine failed to quiet them, but instead they were more restless and moved faster as more of the drug was given, while other horses treated by novices with sage tea or peppermint recovered, and drew therefrom the conclusion that so far as colic is concerned, veterinary science is a conspicuous failure, and there was much logic in his conclusion.

I recently saw a horse very much excited by one grain of morphine given to relieve pain after castration, and to relieve

this excitement two grains more were given, which rendered the patient utterly uncontrollable and dangerous to approach, and it was only with the greatest difficulty that chloroform was administered and a very serious case of opium poisoning checked.

While we commend morphine in spasmodic colic, we caution judgment. Owing to the generally empty condition of the digestive canal, purgatives are uncalled for, and, as already stated, should on no account be given if opium has been employed to relieve the pain. Hot fomentations and stimulating applications to the abdomen are probably of more service in these than in other colics.

Cannabis indica is preferred to morphine by many in these cases, and it certainly presents some points of superiority.

Colic due to external mechanical pressure, such as being accidentally or intentionally cast in a cramped attitude, calls for little remark as to treatment, beyond the very obvious suggestion of placing the animal in a comfortable position. The fact that colics do arise from casting, should suggest care in our methods to avoid cramping the limbs and body as far as possible, especially for operations of long duration. We should be careful too that colic patients do not have their malady aggravated by being left cast in an uncomfortoble position, and we also should bear in mind that probably not an insignificant number of colics are due primarily to poorly fitting, uncomfortable harness and improper hitching, by which the body is thrown in a strained position for a long period in cases.

Where colic can be traced to the presence of parasites in the digestive canal, we generally find coincident debility, thus suggesting stimulants, carminatives and bitter tonics, combined with vermifuges, which should be followed by an aperient, preferably oil, while in some cases where the patient's strength will permit it, a brisk purgative may be substituted with advantage.

The presence of calculi in the digestive canal are rarely diagnosed during life. They are then to be treated, if not by surgical interference, by oleaginous aperients, and, if available, by warm enemata, in order to soften the fecal matter and relax the intestine in which the calculus is imprisoned. Drastic purgatives should not be employed ; as a rule, their violent

action may result disastrously ; but if used at all, it should be done early, before the affected parts become paralyzed and inflamed.

Colic due to the ingestion of sand should be treated with a view to gently expelling the sand and allaying irritation of the bowels by means of moderate quantities of bland oil and demulcent gruels.

In general, we would say—In all forms of colic see first that no remedy administered can in any probable manner exert an unfavorable influence upon any pathological condition present. We should always avoid, until we have clear evidence of their necessity, purgatives and agents which induce intestinal paralysis, and in all events avoid, if the action of either is desired, the combination of the two. It should be constantly remembered that purgatives are rarely directly necessary or advisable.

AN IMPROVED METHOD OF PLANTAR NEURECTOMY.[1]

By M. H. McKillip, M. D., V. S.,
McKillip Veterinary College.

It is well known to all practitioners who perform a large number of plantar neurectomies that its practical result is sometimes unsatisfactory on account of an early uniting of the nerve-ends, with subsequent recurrence of feeling and lameness, no matter how long a section of nerve may have been removed. To overcome this annoying result, I have experimentally tried to perfect the *modus operandi* in different ways, and the result has been so satisfactory that I think it expedient to report it for the benefit of those who are called upon to perform this operation.

As the technique of the operation is familiar to you, I shall only refer to the difference of my method. First of all, I have devised a certain preparation of the limb for the operation, which is quite essential. Three days before operating, a cantharides blister is applied over the seat of operation. This is

[1] Read before the United States Veterinary Medical Association, 1895.

washed off after twenty-four hours, the cuticle removed, and vaselin applied to the part. The object of this procedure is to secure a clean field for operation and rapid union. The blister removes the hair and cuticle, doing away with the hair stubbles always left by the clipper, which are an irritating agent. It leaves a clean, smooth surface, and prepares, as nearly as possible, for an aseptic operation and dressing. It excites inflammation of the skin, and the slight swelling and increased circulation promote a union by first intention, a result seldom obtained in the old methods, especially in animals with a thin skin. There is a tendency to produce a little more hemorrhage during incision; but if any should object to this, it is easily prevented by the application of a simple tourniquet.

The operation itself is performed as usual, until the nerve has been dissected and cut at its upper end. Then it is dissected downwards to a length of about one and a half inches and firmly drawn up with forceps by an assistant, while the operator applies a silk ligature to the lowest part of the distal end, tying it as securely as possible with a surgeon's knot. The dissected nerve-trunk is cut above the ligature, and the silk is allowed to hang out of the lower part of the incision to the length of about one inch. No stitches being used, a cotton bandage, saturated with a solution of bichloride of mercury, is applied to the fetlock, which draws the edges of the incision firmly together. Over this is again laid an antiseptic flannel bandage. Within three days after the operation the bandages are removed, when the wound will be found to have united by first intention, with the exception of the lower end, out of which the ligature is now carefully and easily removed. When the ligature comes off, the nerve-end is cicatrized, a granulating process is obviated, and the union of the nerve-ends made thus impossible. The parts are dressed and the bandages replaced in order to support the newly-united tissues. Shower baths for a few days have been found of good service, and in from five to ten days the horse is again ready for work, a result which can hardly be obtained by the old methods.

Of about one hundred horses so operated by me since February last, no report has been made so far of an unsatisfactory result, and all those cases which could be kept under observation have proved a decided success, not only from a surgical view, but also from the practical results obtained.

THE HORSE AS A PRODUCER OF ANTITOXINS.[1]

By Olof Schwarzkopf,
McKillip Veterinary College.

Gentlemen: At a time when we hear so much about the "horseless age," when the praise is sung of the "silent steed" and the horseless carriage parades our streets, then even the calm among us are joyous to see the horse once more in a new field of utility. Of the many usages to which the horse has been put by men for thousands of years, none has ever been loftier than its recent employment as a producer of antitoxins for some of the most dreaded of human diseases.

It will be known to you that the preparation of antitoxins is based upon the discoveries of Behring, who proved "that the blood serum of an animal, rendered artificially immune against certain infectious diseases, if injected into another animal will protect the same against such disease or even cure him after infection." The weak point of this new theory is our lack of understanding of the nature of "immunity," inasmuch as there are several theories, notably those of Pasteur, Metschnikoff, Buchner, Behring, Roux, and others. Each opposes the other; none fully explains its phenomena. We know, however, by empirical observation that certain animals, or classes of animals are protected by nature, are "*naturally immune*" against particular diseases, which are fatal to others. We also know that a certain sickness from certain diseases of men and animals, such as scarlet fever, small-pox, yellow fever, influenza in horses, and many others, usually produce an "*acquired immunity*," at least for a variable length of time against another attack of the same disease. Moreover, we know that we can render animals "artificially immune" against some infectious diseases by protective inoculation. Lately we seem to have reached the point when "curative immunity" can be produced in time to counteract the infection and ward off the fatal toxic effects of certain germ diseases by the application of antitoxins. It is true that this new therapeutics applies at present to only a few diseases, diphtheria, tetanus and a few forms of septicemia, such as puerperal fever of women, but it is no conjecture to conclude that others will

[1] Read before the United States Veterinary Medical Association, 1895.

be added in proportion as our knowledge of the pathogenic germ life becomes clearer and our laboratory methods improve in practicability and certainty of results.

The production of the various antitoxins is preceded by the preparation of their toxins in the bacteriological laboratory. This has been already described in our professional journals, and only for a better understanding of this paper I wish to recall to you that the virulent bacilli of diphtheria and of tetanus and the streptococcus of septic diseases are obtained from patients suffering from these diseases and cultivated on bouillon in large flasks in an incubator for several weeks, when they are filtered through a Chamberland filter, whereby the germs remain outside the filter, the filtrate being the original fluid substance charged with the toxin. The whole process is by no means simple, but calls for tedious work, painstaking accuracy and patience, and in spite of all this may bring disappointments and unexpected difficulties, which must be overcome before further steps can be taken and success attained.

Having thus prepared the toxins, the animal for inoculation is selected, and it has been found that the horse is preferable to any other animal. He is most susceptible to these toxins, most tractable in the almost painless operation of remittent injections; he yields the largest amount of blood serum from one bleeding and most of all produces a therapeutic serum of the strongest immunizing value. The horses selected at our college for this purpose are healthy, strong and large animals of good disposition, between the age of six and eight years, and they make a favorable impression upon those timid visitors who yet entertain doubts as to the value of serum therapeutics.

What interests us most as veterinarians, is the effect which the injections of the different toxins have upon the organism of the horse. There are certain symptoms, such as the rise of temperature, which are common to all toxins; otherwise, however, they are so widely different that it is well to give a separate description of each.

The inoculation with *diphtheria-toxin* has been lately described by Dr. Gill, of New York, and I shall therefore only briefly mention our own method. As the best places for injection we select the thorax and flanks, the proximity to the extremities being avoided, on account of subsequent edematous swellings. A piece of skin, of the size of a dollar,

is shaved, washed and disinfected with a solution of bichloride of mercury. The toxin is then drawn into a sterilized syringe of the capacity of 10-50 cc. and slowly injected subcutaneously. We commence with a small injection of 20 cc. of a weak toxin which is gradually increased during several weeks to 50 cc.

The effect of diphtheria-toxin upon the system of the horse is mainly a rise in temperature of 1½ to 3°, a quickened circulation and accelerated respiration, but not of a very pronounced type. From one to four hours after the injection a certain uneasiness of the horse is sometimes observed, but grave symptoms, as described by others, have not been seen by us. I think that much depends upon the surroundings of the horse, and that a suitable diet and comfortable and large box-stall prevents the horse from fully realizing the unpleasant feeling which no doubt he is undergoing. On the whole, however, the horses evidently enjoy the easy life with which they have been favored; they thrive and easily become fattened.

Very different is the effect produced by the injection of tetanus-toxin. To the skeptic there could hardly be a more convincing proof of the scientific correctness of the elimination of toxins during the progress of some germ diseases than to witness the effect of this toxin. We observed within ten minutes after the injection of 2 cc. very pronounced symptoms of constitutional disturbance. The rise of temperature follows almost immediately, the pulse becomes stringy, and abdominal breathing sets in. In about one hour the masseter became hardened and painful to the touch, accompanied by a peculiar twitching of the muscles of the nose. In two hours and a half the temperature arose to 104 2-10. Occasional grinding of the molar teeth was followed by spells of great nervousness. At intervals the neck was thrown backward and upward and tetanic spasms of the muscles of the neck were noticed, resembling the symptoms observed in a horse that is trying to vomit. Later, light local spasms could be produced in any region by a simple touch. Those symptoms lasted for about eight hours when they gradually disappeared.

It is interesting to remark the effect of the subsequent injections of increasing quantity of toxin with a decreasing severity of symptoms. It is as if one can see the developing immunity, for the gradually increasing power of resistence of the horse against this toxin is very apparent. While our last

injection was as large a dose as 25 cc., beyond a rise in temperature to 104°, none of the symptoms described as observed at the first injections were noticed.

There is great likelihood, however, that all horses do not react with equal gravity after the first injection. We inoculated, experimentally, an old and hardened horse with 20 cc. of toxin and anticipated very grave results at first. For about one hour, however, the old horse stood motionless, exhibiting no reaction beyond a sudden rise in temperature of 2°. Then he showed gradually uneasiness with an occasional spasm of the neck and a peculiar arching of the back. Within two hours and a half the temperature rose to 104 2-10, the horse became extremely sensitive to the touch, and pressure at the point of injection in the shoulder produced spasms of the muscles in that region. After several hours, being suddenly approached by a stableman, he fell backward and died within fifteen minutes under tetanic convulsions.

Symptoms still different are produced by the injection of streptococcus-toxin. The main effect is an elevation of temperature of one to two or more degrees, which extends over the second or even the third day. The other symptoms become visible within three to four hours after injection, and are not very marked, but none the less severe. The horse stands rather quiet, the head bowed downward, paying no attention to its surroundings or to noise, or to food offered him. He remains so for hours at a time and he gives the impression of being a "pretty sick horse," as a visiting veterinarian expressed it the other day. After the fifth injection of this toxin the horse showed symptoms of colicky pains, looking at his flanks and biting them occasionally.

These are our observations up to date, and as far as I know the effect of the tetanus-toxin and streptococcus-toxin upon the horse have not been published before. Inasmuch as these observations were conducted on a limited number of horses, they are subject to modification, but on the whole they will be found to be correct. The symptoms, as described, will greatly depend upon the preparation of the toxins, the germs producing different toxicity according to the soil on which they are cultivated. It is a matter of bacteriological experience to select a material of such chemical composition as will produce the highest toxicity, and much depends upon the skill of the

bacteriologist. I think some of the toxins, if properly prepared, may be profitably used for demonstrative purposes for students, as the effect is so marked and characteristic.

After the horses have been inoculated with these toxins for a sufficient length of time to endure large doses, and after having fully recovered from the effect of the last injection, a sample of blood is drawn, and the serum separated under aseptic precautions and injected into experimental animals which have previously been infected. If by this experiment the serum proves to contain sufficient antitoxic properties, large quantities of blood are drawn for the preparation of antitoxin for therapeutic purposes.

As to the application of the tetanus-antitoxin and streptococcus-antitoxin in veterinary practice very few, if any, trials have yet been made, as these new therapeutic agents are of so very recent date. We treated one horse, which was beyond hopes of recovery, with a 10 cc. dose of tetanus-antitoxin, merely to satisfy the owner who wanted us to try anything to save the horse. Although this was all the quantity he had on hand and too small a dose, he informed us, the morning after the injection, that there was a noticeable improvement in the condition of the horse, but he died the same night. I report this negative result in order to dispel extreme expectation. Reports from the human hospitals indicate that the early application of tetanus-antitoxin, if accompanied by proper surgical treatment of the wound from which the infection started, is bound to result in a cure. With the frequency and gravity of tetanus in the horse, we certainly look toward this new therapeutic agent with great hope, and it remains to be seen whether its success in veterinary practice will be equal to that obtained in human medicine.

Whatever may be the future of serum therapeutics, I should warn you against too much enthusiasm. Let us cautiously try these new remedies if they are such, and not give an off-hand judgment as has already been done by some. Success will alternate with failure, and the supporters and enemies will view it from their opposite standpoint. As far as veterinary science is concerned, it is certain to play an important factor in the development of serum therapeutics, and to us as members of this science it will add greater responsibilities and insure greater opportunities.

PHYSICAL DIAGNOSIS.[1]

By Dr. Jacob Helmer,
Scranton, Pa.

Physical diagnosis is the process of distinguishing diseases by their physical (objective) signs, without recourse to subjective symptoms. It depends on scientific methods of physical examination, as inspection, auscultation, percussion, palpation, mensuration and succussion, assisted by any mechanical aids or instruments that may, by extending the power of the physical senses, be useful in detecting the signs of disease. Its conclusions are confirmed by clinical observation and the autopsy.

A paper limited to the time of a brief essay cannot apply the idea of this subject to the variety of diseases of the organs and tissues found in the animal body. We therefore select a group: *the pulmonary diseases of the horse*, and confine this article to a discrimination of them by the methods of physical diagnosis.

The value, comparatively, of the methods of physical examination is less in the veterinary than in the human practice of medicine.

The anatomy of the horse's chest renders thorough physical examination extremely difficult. It is not easy to listen and hear sounds through such a thick wall. The voluntary movements of the skin over the panniculus carnosus muscle interferes. Some sounds may not be heard, being under the scapular region. The usual restlessness of the animal and the awkward attitude of the examiner are among the obstacles to be overcome.

Inspection.—This signifies the use of the sense of sight to detect physical signs. Inspection of the exterior of the chest reveals its form or shape and the number and character of its movements.

We need not dwell upon the idea of *Form*. It generally indicates in the horse degrees of vital capacity consistent with excellent health.

Tubercular tendency or disease in the human family renders study of the form and size of the chest practical and necessary.

[1] Read before the Penna. S V. M. Assoc., 1895.

The movements of the chest are of great importance, since they constitute the first step of the act of respiration, and all the other steps depend on them. A respiratory act consists of an inspiration, an expiration and a pause. This cycle is completed by a contraction and expansion of the chest walls.

In health and at rest the movements of contraction and expansion are normal in number and character. When above the normal number they are *frequent*, as during exercise; frequency of movement not caused by exercise or thermic conditions is a sign of disease. *Infrequent* respiratory movements are abnormal, and are usually due to morbid changes in the brain or the action of narcotic poisons.

The movements of the chest walls may be *partial* or *complete*. A partial or limited movement of contraction signifies shallow respiration and the use of little air in the lungs. A complete or extended contraction indicates powerful and deep respirations, and the change of much air in the lungs. These characters may be both frequent and infrequent.

The natural *rhythm* of the movements may be disturbed; hence these may alternately be regular and irregular. Again: the relation existing between the thoracic and abdominal movements in health may be broken. When, by conditions of disease, constriction of the thoracic muscles and diaphragm occurs, thus lessening their normal movement and amount of work, the movements in the assisting abdominal muscles become increased. This is well marked in pleurisy, when the abdominal muscles are brought to perform an unusual amount of work while the thoracic muscles are more or less fixed on account of pain in the inflamed pleura.

In peritonitis, where the pain is felt under the region of the abdominal muscles, these become fixed, and the normal movement of the thoracic muscles is increased. Inspection, in pleurisy with hydrothorax, notes an increase in the size of the lower part of the chest. The attitude, breathing and facial expression of the animal denote pain; the abdominal furrow or ridge the extent to which the abdominal muscles are brought into use. Inspection notes the double movement of the abdominal muscles in pulmonary emphysema, and, assisted by the thermometer, it notes the rise and fall of animal heat.

Palpation.—This in medical language denotes the process of examining morbid conditions by the sense of feeling or by

touch. By it we recognize tenderness, resistance, fluctuation, pain—the presence or absence of normal animal heat; also impulse from movement of an internal body or organ. Subcutaneous emphysema is detected by laying on the hand. It detects a crackling sensation under the skin caused by the movement of air in the cellular tissues. By palpation we note the character of tumors as fibrous, osseous, granular, soft, hard or fluctuating. Palpation is useful as an aid to inspection and percussion.

By it we note difference in resistance, as well as of sound in percussion. Application of the hand to the chest informs us of the number and force of the beats of the heart, the shape of the chest walls, their movements or number of respirations, and the character of them. We note sensitiveness to pain on pressure, and sometimes the friction murmur of pleurisy.

Mensuration, or a system of measurements of the chest as an aid to diagnosis, is not commonly practiced by veterinarians. It might be useful in the study of pleurisy with hydrothorax in the horse, if the disease were unilateral, as in man. But all we can learn by any system of measurement, however skillfully applied to the chest of the horse in pulmonary and cardiac trouble, may be known from the other methods.

The first measurement is made with a graduated tape around the body from a point slightly posterior to the withers. At least three such measurements should be made at a few inches distant from each other.

These measurements should be taken at the end of a complete inspiratory and expiratory movement; at least in the same stage of the respiratory movements. A second series of measurements are made, beginning at a given point on the withers to the commencement of the cartilage of the false ribs, beginning with the eighth. Again from the lower end of the third rib to the same point. Lastly, along the middle of the chest from the posterior border of the shoulder to the margin of the last rib. These measurements are made at the same points on both sides of the chest, and at the same point of contraction and expansion of the chest walls.

Of the methods of physical examination applied to detect diseases of the chest, the most important ones to us are auscultation and percussion.

Before applying these methods, let us, for convenience and accuracy, divide the chest into three regions: an anterior and two lateral. The lateral regions may be further subdivided in three nearly equal parts, by drawing two horizontal lines across th chest. These subdivisions are a superior, a middle and an inferior third. The superior third contains lung substance, closely in contact with the internal wall. The middle third contains much lung substance; also the large bronchial tubes in its anterior part, and the large blood-vessels at the base of the heart. In the lower third there is less lung substance; but in its anterior part the heart is principally situated opposite the third, fourth, fifth and sixth ribs. This area, sometimes designated the triangular space, is covered by the forearm and its extensor muscles. The limb must be pulled forward in order to examine the region over the heart.

Auscultation is the art of listening over a part to detect abnormal sounds, and especially the conditions that give rise to them. It is the most important method of physical diagnosis. It was discovered by Reno Theophile, H. Lænnec, who lived from 1781 to 1826. It was introduced into veterinary practice by Delafond and Leblanc. The facts elicited by auscultation and percussion, and their verification by post mortem examination, revolutionized the knowledge then in existence of the diseases of the chest, and began an era of exact demonstration.

Auscultation is of two kinds—mediate and immediate. In the former, an instrument, the stethoscope, is placed between the ear and the part to be examined. Immediate auscultation is where the ear is laid directly against the part. The veterinary practitioner should depend upon the ear only. An excuse for the use of a stethoscope is afforded where parts have been blistered; but a handkerchief may be laid between the ear and the part. To use the stethoscope successfully, it is necessary to press the chest piece quite hard against the part, an action which the animal resists. Applied to the chest, the object of auscultation is to discover sounds normal or abnormal in connection with the lung substance, pleura or bronchi. It also notes absence of sound and sounds conducted from other parts.

The class of normal sounds heard over the lungs are bronchial breathings and the vesicular murmur. Bronchial breathing is normal when heard in the middle third of the

chest of bovines, or over the human chest. It is likened to the sound produced by the wind blowing steadily through green leaves.

Bronchial breathing and the vesicular murmur are abnormal when heard in places in which they are not heard in health. In pneumonia the vesicular murmur may be lost in the middle third, and heard more plainly in the superior and inferior thirds of the chest. It then becomes an abnormal sound. Bronchial breathing is also an abnormal sound when it is heard plainly in the upper and lower thirds, and lost in the middle third.

The respiratory murmur is normal when heard over the middle portion, and less distinctly over the superior and inferior thirds.

Bronchial breathing sounds like a moderate current of air passing steadily through a tube or out of the nozzle of a bellows. It is closely imitated by making the sound of the letter K in the roof of the mouth. It is best heard over the anterior part of the chest at the bifurcation of the trachea. In health, at the sides of the chest it is apt to be lost in the vesicular murmur.

The vesicular murmur is a sighing sound. It may be plainly heard over the exudate. These two sounds may be increased or diminished in their normal situation. In pneumonia one part of the middle third may be blocked with exudate, and the vesicular murmur lost in that part. But it will be found increased in other parts of the middle third not diseased.

Râles.—We shall next consider the class of *abnormal sounds* known as râles.

These are moist and dry. Moist râles are subdivided into mucous, sub-mucous and sub-crepitant. Dry râles are divided into sonorous, crepitant and sibilant.

The soronous râles are heard over the large bronchial tubes in the middle and upper portions of the chest in the first stage of bronchitis. The sibilant râle is heard in the upper and lower portions of chest over the small bronchial tubes. It is a hissing sound.

Bronchitis is a bilateral disease; hence these sounds may be heard on both sides of the chest, both on inspiration and expiration.

The crepitant râle is heard in the first stage of pneumonia, principally over the middle portion of the lung. It is a snapping sound, and is closely imitated by stroking the hair of a cat in an opposite direction to which it lies.

We may not see our patients early enough to hear this râle. It is caused by the air rushing into the air cells and separating their walls, which have become more or less adherent by the exudate.

Mucous râles are bubbling sounds, heard in the upper portion of the chest on both sides. They sound like minute bubbles due to blood, pus or serum, or an admixture of them. They are heard both on inspiration and expiration.

If heard on the lower portions of the chest, they are called sub-mucous râles. These bubbling sounds change their place as the material moves along in the bronchial tubes.

The sub-crepitant râle is heard in croupous pneumonia. Here we have the exudate in the air cells changing into liquid. The air passing in and out gives rise to a minute bubbling sound. It is heard in the third or resolving stage of pneumonia, both on inspiration and expiration.

Other Sounds.—A *gurgling* sound may be heard in the second stage of pneumonia. It is due to the movement of fluid in the large tubes, and heard on inspiration and expiration. It is heard at the anterior post of the chest, over the trachea and bronchi. Another sound is *metallic tinkling*. It is heard over the chest and at the nostril in pleurisy. It is heard during inspiration and expiration. It is not often heard at the chest. It is caused by drops of fluid falling into a collection on the bottom of the cavity. It may also be caused by the bursting of a bubble on the side of a cavity or by the impingement of a drop of water on the wall of a cavity.

Metallic tinkling is pathognomonic in pleurisy.

Percussion is the process of striking a part with the tips of the bent fingers in order to elicit sounds, upon the character of which depends the condition of the tissues underneath. It was discovered by Leopold Avenbrugger, a Vienna physician, who lived from 1722 to 1809. He practiced direct percussion only. He first began the study of sounds as indications of morbid conditions. The idea was introduced into France by Corvisart in 1821. Mediate percussion was suggested by Piorry in 1828.

It is customary in percussion to lay the middle finger or two fingers of the left hand upon the part and strike with the finger tips of the right hand. Every physician has his own way of percussing. The striking should be a wrist movement; not a fore-arm movement. The blows should not be too heavy and be made with discrimination. To percuss well is an art in which one can only become proficient by long practice.

Sounds elicited by percussion vary in intensity, quality, duration and pitch.

Intensity means the loudness, quality the kind of sound, duration the length, and pitch the degree of sound.

Percussion sounds are due to the vibration of air in the air cells and of the chest walls.

Percussion on a healthy subject shows that the results are not the same on both sides of the chest. Over the plane of the upper third on the right side, the sound is the same back to the eleventh rib. Behind this there is a degree of tympanitic resonance. On the left side, over the upper third, the resonance gradually lessens from the twelfth rib back. Over the middle third on both sides, the degree of resonance is about the same from the sixth to the twelfth rib. Behind this it is dull on the right side and more resonant on the left side.

On the lower third, percussion is clear back to the tenth rib, where it becomes more dull. On the left side dullness is found over the thirteenth rib.

So in the middle portion we find increased pulmonary resonance, and in the superior and inferior portions we find diminished pulmonary resonance.

Resonance is divided into two kinds, pulmonary and tympanitic. Pulmonary resonance is that obtained by percussing over healthy lungs. Tympanitic resonance is heard when there is air inside of a cavity. It is a ringing, metallic sound when caused in this manner.

In percussion, sounds are increased, diminished or absent. In the degree that it is diminished it is a dull sound. If absent it constitutes flatness. Flatness is due to effusion of fluid into a cavity.

Pulmonary resonance is increased in left lung if the right one is closed. As the sound depends on the amount of air in the tissues, when one part of the lung is blocked, adjacent parts will become more resonant. Pulmonary resonance is

diminished when there is less than a normal quantity of blood present, or where there is exudate, or where there is an increased amount of blood in a part, as in congestion of the lungs, and in effusion into the interlobular connective tissue.

Having now considered the various methods of physical examination, and described the physical signs afforded by them, let us give attention to a brief description of the morbid anatomy of the most common pulmonary diseases, with the physical signs found connected with them. Then we shall see clearly how to make a differential diagnosis of these conditions.

Pneumonia.

This disease is divided into three classes, *croupous*, *catarrhal* and *interstitial*. Croupous pneumonia is the kind we commonly meet. It is an acute inflammation of the vesicular structure of the lung, followed by temporary blocking of the air cells with exudate, and exclusion of air.

In the first stage there is an increased amount of blood in the capillary vessels. This causes pressure on the air cells and diminishes their caliber. Subsequently comes dryness; the secretion of plastic material blocks the air cells. The tissues become the color of liver, being engorged with sero-fibrinous exudate. The third stage, or that of resolution, is marked by the material becoming milky white. There is now some air again in the cells. Absorption goes forward.

The physical signs of croupous pneumonia in the first stage appear in about twenty-four hours. If the disease is anterior or central it may take two or three days.

Inspection notes diminished movement of chest wall on affected side (on both sides if it is double pneumonia), also the increased use of the abdominal muscles.

Percussion in first stage gives some dullness over diseased part. Central pneumonia may not yield dullness until advanced to the second stage.

Auscultation in first stage is not satisfactory until exudation has taken place. Then we hear the crepitant râle. It lasts but a few hours.

Inspection in second stage shows the wall over the affected lung to be more quiet than in the first stage. Movement of the normal side increased.

Percussion yields dullness over the diseased part of the lung, while normal portions yield increased resonance.

Auscultation in the second stage yields no vesicular murmur over the affected portion. The crepitant râle has disappeared and bronchial breathing has taken its place. The more condensed the lung tissue the plainer the bronchial breathing becomes.

Percussion in the third stage yields less and less dullness until the exudate has been absorbed.

Auscultation in third stage finds the bronchial breathing disappearing. Again the crepitant râle may be heard ; then the sub-crepitant, as the exudate becomes more liquefied ; and finally the vesicular murmur returns.

Should purulent infiltration set in, the temperature remains high ; the pulse is frequent and weak, prostration is marked, bronchial breathing continues ; also dullness on percussion. A discovery of minute gurgling râles may complete the diagnosis. Termination in gangrene is known by great prostration or collapse. We look for the gangrene odor.

Chronic Interstitial Pneumonia

or pulmonary tuberculosis, is rarely seen in the horse, but may be in old horses. It may arise from the extension of an ordinary pneumonia. It is accompanied by formation of tubercle or caseous material.

Catarrhal Pneumonia

is always secondary, due to the extension of the inflammation from a previous bronchitis.

Acute Bronchitis

is an inflammatory condition of a part or the whole of the mucous membrane of the large bronchial tubes.

In first stage we find congestion of the mucous membrane It becomes dry and swells. The tubes become constricted and diminished in caliber. In the second stage we have a catarrhal exudate. The glands are enlarged, mucous membrane swollen and tubes constricted.

Auscultation in the first stage finds the sonorous râle. It is heard on both sides—both on inspiration and expiration. The

sound is best heard over middle third between sixth and twelfth rib. The sonorous sound is due to the dryness of the tubes in connection with their diminished caliber.

In the second stage, when the exudate is thrown out, we get a mucous râle both on inspiration and expiration. The sound comes and goes. The secretion may or may not be expectorated. We may not always hear the mucous râle.

Percussion in the first stage usually gives an increased resonance. In fat horses it is almost impossible to distinguish. In the second stage, the change in resonance on percussion is slight.

Capillary Bronchitis

percussion yields increased resonance on both sides, in both stages, unless in old animals. There is on auscultation a mucous râle and hissing sound. In second stage we find a sub-mucous râle. Old animals may not be able to cough up the mucus which may block some of the tubes.

Asthma.

This morbid condition is a neurosis. It gives rise to paroxysms of dyspnea at recurring intervals. It is probably due to constriction of the circular fibres of the bronchial tubes, which causes a wheezy breathing while the paroxysm continues.

Pulmonary Emphysema.

This is a condition characterized by loss of elastic power in the air cells. The walls become stretched and contain more than a natural amount of air. There are two varieties: the vesicular and the interstitial. In the former the excess of air is in the air cells; in the latter it is in the connective tissue between the cells. The tissues may become ruptured and the cells come together, thus forming large bladders.

Inspection notes that the chest walls may be enlarged. The abdominal muscles are brought into use in proportion as the disease has advanced. The expiratory movement is much prolonged and consists of three parts. A movement, or pause, then another movement.

Percussion gives increased resonance over portions of the chest.

Auscultation finds a variety of sounds. In a general way we may say the sounds are of a crepitant, sibilant and sonorous character.

Broken Wind.

This name is still applied to a condition of difficult respiration closely resembling that of pulmonary emphysema—a spasmodic breathing, with a short inspiration and a prolonged and double expiratory movement.

The malady is of nervous origin, and asthmatic in character, lacking the recurring paroxysms, but exhibiting a more or less continuous dyspnea. In this disease the structural changes have taken place in the circular fibres of the smaller bronchial tubes. This muscular fibre is in a state of constant contraction (?) having become paralyzed from continuous irritation of the nerve filaments supplying the muscle. This irritation is of gastric origin.

The integrity of the alveolar passages and air cells is impaired in time through innutrition. Degeneration follows, with production of pulmonary emphysema.

Pleurisy.

This is an acute inflammation of the serous membrane lining the chest cavity, forming the mediastinum and covering the lungs. It may be partial or general.

The first pathological character is congestion of the blood vessels of the pleura and the sub-serous connective tissue. At first the membrane is dry. This is followed by a fibro-serous exudate. The pleura becomes edematous in patches. It becomes thickened; loses its polished appearance, becoming dried and rough. The fibrinous lymph of the exudate forms membranes or deposits on the pleura. The serous portion of the exudate falls to the bottom of the cavity. The false membranes may build up and form thick fibrous structures. These may be cartilaginous or osseous in structure. Such structures are rare and are not due to a simple exudate, but a proliferation of the cell elements of the pleura. The liquid exudate is absorbed by the lymphatics. The false membranes undergo fatty metamorphosis and are taken up by the lymphatics.

Inspection in the first stage of pleurisy notes that the respirations are short and quick; especially the inspiratory act.

Evidently the act of respiration causes pain. The abdominal type of breathing is increased. The chest is enlarged in the latter stage and may be bulged.

Auscultation in the first stage gives the friction murmur, a sound similar to that obtained by rubbing together the palms of the hand. It is caused by the now swollen membranes coming in contact with each other in the movements of the lung. *Auscultation* in the second stage denotes loss of respiratory murmur in the inferior third of the chest and upwards in proportion to the depth of the effusion.

Percussion in the first stage yields a slightly diminished pulmonary resonance. But dullness increases as the disease advances. Percussion over the effusion yields a flat sound. Above the fluid line there may be a semi-tympanitic resonance, which will be referred to elsewhere.

Edema of the Lungs.

This is a condition characterized by a fluid effusion, serous in character, into the air cells and possibly into the surrounding connective tissue. It is a bilateral condition. It is a sequel of some debilitating disease. It may appear with congestion of the lungs. It appears suddenly. Inspection notes difficult but feeble respiration. There is no elevation of temperature.

Percussion yields dullness; *auscultation* may detect moist râles.

Pulmonary Congestion.

This condition is caused by a sudden influx of an increased quantity of blood into the pulmonary vessels. Inspection reveals dyspnea, frothy expectoration, tinged with blood. Animal may appear excited or depressed.

On auscultation the cardiac signs are increased. The respiratory murmur is diminished and bronchial breathing increased. On percussion there is loss of pulmonary resonance on both sides of the chest. It is a bilateral malady. Autopsy reveals the lungs deep dyed and crepitant.

Differential Diagnosis.

The differential diagnosis of these various diseases of the lungs has made itself apparent in what has been already said of them. It only remains to restate the distinctions in a concise manner.

Croupous pneumonia in the first stage is distinguished from bronchitis in the same stage by the former having a crepitant and the latter a sonorous râle.

In bronchitis there is no consolidation of living tissue, as in pneumonia. It is a bilateral disease. It yields mucous râles in the second stage and increased resonance on percussion. All these are the opposite in pneumonia.

Croupous pneumonia is known from capillary bronchitis by about the same signs as bronchitis. In capillary bronchitis we have in the first stage a hissing sound, the sibilant râle.

Croupous pneumonia is known from pleurisy by the friction murmur of the latter in the first stage. In the second stage by flatness on percussion. The upward limits of this loss of resonance is bounded by a horizontal line. Pleurisy, with effusion, is a bilateral disease in the horse. In pleurisy we have the increased abdominal breathing and the appearance of the abdominal furrow.

Pneumonia is distinguished from asthma by one being a febrile, the other a non-febrile disorder. Pneumonia is regular in its course; asthma comes in paroxysms. Asthma is characterized by a wheezy breathing, performed with much labor during the paroxysm. In pneumonia the breathing is panting in character.

A paroxysm of *asthma* is distinguished from an attack of congestion of the lungs by the wheezy breathing of the former. In asthma, on percussion, pulmonary resonance is greatly exaggerated, and auscultation yields an increase of the respiratory murmur and sibilant râles. These are of the opposite character in congestion of the lungs. There is little or no fever in asthma and in a severe attack the animal coughs very frequently.

Asthma may be confounded with bronchitis in the first stage, but the high temperature of bronchitis and the congestion of the Schneiderian membrane and conjunctiva will establish the difference.

Congestion of the lungs may be distinguished from the congestive stage of pneumonia by the latter having very high fever and being ushered in by a chill.

Pneumo-thorax, or air in the chest cavity, may be distinguished by well marked tympanitic resonance on percussion. It must not be confounded with the conditions that

sometimes exist in pleurisy or pneumonia that give rise to a diminished tympanitic resonance.

In pneumonia a tympanitic sound is transmitted through a portion of consolidated lung, on heavy percussion, in some rare cases. It is supposed to be caused by the vibration of air in a large bronchus or in a cavity. Again, in pleurisy, with much effusion we find a tympanitic resonance above the fluid line. It may be caused by relaxation of the air sacs and diminished tension of the lung tissue.

Finally, there is no royal road to physical diagnosis. Its problems must be worked out for one's self. Originality is not claimed for this paper. The ideas are modified from personal experience, observation and mode of expression. My object has not been so much to teach as to refresh you in matters which above all others combine to make the successful diagnostician.

SERUM THERAPEUTICS.[1]

By Simon J. J. Harger, V. M. D.,[2]
Professor of Veterinary Anatomy and Zoötechnics, University of Pennsylvania.

The discovery of serum therapeutics, now applied in practice, has opened a new era in the treatment of disease. Although confined as yet to a limited number of diseases and not yet thoroughly tested, this method of treatment has opened a field of experimentation whose limits to-day we cannot define. A general resumé of the subject may not be amiss before this meeting.

It is known that the vegetable alkaloids, abrine, ricine, etc., very poisonous to animals, can, when given in repeated and very small increasing doses, develop an immunity in these animals, which are thus able to withstand a quantity of these substances rapidly fatal to those not previously treated. A product is formed in the system which becomes sufficiently abundant to neutralize the toxic action of these poisons. Likewise in morbid processes, the repeated introduction into the

[1] The experimental information is drawn from "Annales de Pasteur Institute," Sept., 1894.

[2] Read before the Penna. S. V. M. Assoc., 1895.

system of a microbe, or its product called *toxin*, causes the formation in the economy of a substance called *anti-toxin*, which is capable of counteracting the pathogenic action of such microbes or their poisonous excretions. This, in a word, is the basis of the so-called anti-toxin treatment.

Serum therapeutics was first studied in a crude way in cow-pox and septicemia in the dog, but has only attracted special attention since Behring and Kitasato have demonstrated the properties of the blood-serum of animals immunized against tetanus and diphtheria. They recognize in the blood-serum of such animals both preventive and curative properties when injected either before or after the introduction of disease germs into the body.

Some anti-toxic blood-serums have the power of counteracting the virus of other diseases. Thus, the serum of animals immunized against symptomatic anthrax is effective against the bacillus of acute septicemia (Duntschman). The serum of a healthy man and at times that of the horse is immunizing against the intra-peritoneal injection of cholera (Pfeiffer). The prophylactic action of blood-serum is therefore not absolutely specific ; it is possessed in some instances by normal serum.

Both the toxin and anti-toxin are albuminous bodies, very similar in chemical properties, but different in physiological action and precipitated by alcohol, which enables its preparation in a condensed form.

Preparation of the Toxin.—The process of preparing the toxin varies with the variety of the specific microbe. Suffice it to say that the latter is grown upon a favorable medium, such as bouillon, gelatin, agar, etc., the mature culture (diphtheria) being passed through a chamberland filter ; the filtrate, a clear liquid containing the toxin, is preserved in well filled, corked bottles. It gradually loses its activity.

Immunization of the Animal.—This may be accomplished by subcutaneous injections of small and repeated doses of pure or heated toxin ; a better method, that of Roux and Villard, consists in mixing three parts of toxin with one of Gram's solution of iodine. The initial dose in the rabbit is ½ cc. (7 drops) repeated every three or four days for several weeks ; the dose is thus gradually increased, and finally the undiluted toxin is given. The horse is the animal usually selected to furnish the anti-toxic serum of tetanus and diphtheria. He is not very

sensitive to the diphtheritic virus, but the serum can be readily obtained in large quantities by bleeding from the jugular vein, and, besides, this serum has proved to have a strong anti-toxic power. Of course, he must be free from any disease, and glanders must be eliminated by injections of mallein. For diphtheria, the cow, dog, sheep, goat and rabbit can also be used. The cow is very sensitive to the diphtheritic poison, even fatally so ; the toxin is excreted with the milk.

Formation of the Anti-toxin.—The anti-toxin is a cellular secretion, but it is not determined which set of cells are active in this process. It is not a transformation in the body of the toxin injected. The anti-toxin diminishes with the cessation of the toxin injections. In one experiment, two rabbits were each injected with 103 cc. of tetanus toxin, the first in thirty-three daily doses, and the second in nine large doses. The serum of the first neutralized one hundred and fifty parts of tetanus toxin ; that of the latter only twenty-five parts. The two serums were of unequal preventive power ; the quantity of toxin injected was the same in both cases, but the methods of administration differed. By successive bleedings in the rabbit, a quantity of blood equivalent to the entire volume of the circulation can be removed, and anti-toxic power of the blood is not sensibly lessened. The anti-toxin is secreted as rapidly as it is drawn away without any new injections of toxin.

An important question is the manner of action of the anti-toxin after introduction into the body. In diphtheria and tetanus it counteracts the effect of the toxin ; in some diseases it is protective only against the microbe, and such animals remain as sensitive to the toxin as those which are not immunized.

A mixture of anti-toxin with an immunizing power of one billion and tetanus toxin, 1-1000 cc. of which destroys a mouse, in proportion of 1 to 900 becomes harmless. ½ cc. (1-1800 cc. serum) injected into a guinea-pig, does not produce tetanus. This result, however, is not always the same ; a mixture innocuous to the mice is fatal to guinea-pigs. In eight out of ten guinea-pigs, ½ cc. (1-900) is inactive, while the remaining two develop tetanus ; again, 1 cc. (1-500) is harmless to guinea-pigs, while 3 cc. cause tetanus.

These experiments show that it is not a question of neutralization or chemical union between the toxin and anti-toxin in

the blood, but rather the stimulating action of the former upon the animal cells, enabling them to resist the action of the virus of the disease.

The existence of a previous disease or a previous injection of microbic products is not without effect. It weakens the animal tissues which respond less strongly to the stimulating action of the anti-toxin. Roux and Villard injected five guinea-pigs with ½ cc. of anti-toxin serum and toxin (1 to 900) with a negative result. Five other guinea-pigs, which had some time before immuned against the vibrion of Massaonah, developed tetanus with the same treatment as the preceding five. ⅓ cc. only produced tetanus, when the aminal is subsequently injected with microbic product, coli bacilli, etc.

In eighty days, the horse, the details of immunization of which I will cite at the end of this paper, received over 800 cc. of toxin without any symptoms other than a slight local edema and an elevation of temperature of one degree.

The serum of a horse immunized in this manner has a preventive power of more than 50,000; that is, a guinea-pig inoculated with 1-50,000 part of its own weight of the serum twelve hours before, will resist the action of ½ cc. of a virulent culture of diphtheria bacillus. One-tenth cc. of this serum and 1 cc. of diphtheria toxin do not produce any edema in the guinea-pig when injected under the skin.

The horse is kept in this condition of immunization by injections at intervals of fifteen to twenty days of diphtheritic toxin (about 200 to 250 cc.).

Roux and Martin immunized the horse with 40 cc. of the toxin heated to 65° C, given in eight doses at intervals of ten days; he was then injected with 1 cc. of pure toxin, repeated at regular intervals. The virulent bacilli are also employed for this purpose.

The serum employed by Roux and Martin in children and guinea-pigs in doses of 1-10 cc. killed the latter in forty-eight hours. Guinea-pigs injected with a quantity of serum equal to 1-100,000 part of their weight, resisted a dose fatal to "control" animals in five days; 1-50,000 immunized them against a quantity fatal in forty-eight hours.

Injection having taken place, the quantity of serum necessary to preserve life must be proportional to the time elapsed since the introduction of the poison into the system.

Guinea-pigs receiving a dose fatal in forty-eight hours, survived after an injection equal to 1-1000 part of their weight six hours afterward; the same treatment twelve hours afterward was ineffective.

This is the principle of the serum treatment of diphtheria in children, which in many instances has given such happy results. The anti-toxin is not of uniform strength in all cases, a fact which explains the alarming and fatal symptoms occasionally seen.

The dose must be graduated according to the virulency of the serum, the weight of the subject and the time elapsed since the introduction of the poison.

The following illustration will show the manner of immunization: Horse, seven years of age, weight, 900 pounds. Serum very active; 1-10 cc. killed guinea-pig in forty-eight hours. Injected hypodermically on the neck or behind the shoulder.

Day.	
1st	Injection, ¼ cc. toxin (1-10 iodine). No reaction, local or general.
2d	Injection, ½ cc. toxin (1-10 iodine).
4th, 6th, 8th	Injection, ½ cc. toxin (1-10 iodine).
13th, 14th	Injection, 1 cc. toxin, no reaction, (1-10 iodine).
17th	Injection, ¼ cc. pure toxin, slight edema, no fever.
22d	1 cc pure toxin, slight edema, no fever.
23d	2 cc. pure toxin, slight edema.
25th	3 cc. pure toxin, slight edema.
28th	5 cc. pure toxin, slight edema.
30th, 32d, 36th	5 cc. pure toxin, slight edema.
39th, 41st	10 cc. pure toxin, slight edema.
43d, 46th, 48th, 50th,	30 cc. pure toxin, edema marked, disappearing in forty-eight hours.
53d	60 cc. pure toxin, edema marked, disappearing in forty-eight hours.
57th, 63d, 65th, 67th,	60 cc. pure toxin, edema marked, disappearing in forty-eight hours.
72d	90 cc. pure toxin, edema marked, disappearing in forty-eight hours.
80th	250 cc. pure toxin, edema marked, disappearing in forty-eight hours.

Tetanus.

The toxin of *tetanus* is very active. A healthy horse has been destroyed by 1-10 cc. (2 drops). Horses can be immunized against tetanus in the same manner as against diphtheria.

The toxin pure, heated to 65° C., or mixed with iodine, is injected in repeated and gradually increasing doses at intervals. The animal thus becomes so "accustomed" to the poison that 250 to 300 cc. can be given at a single injection, enough to destroy 2500 horses (Nocard).

This serum is preventive and curative: it can be used as a vaccine or a therapeutic agent. Injected under the skin of a tetanic subject, it is efficacious only in proportion as the time elapsed since the infection has been short. I have no statistics of this treatment in the horse, but hope to be able to give it a trial. It is useful as a preventive only when the virus, or shortly afterwards, is introduced into the circulation. Unlike diphtheria, tetanus is not recognized until the system is saturated with the poison, then no treatment is of much avail.

The serum may be recommended as a preventive in places where tetanus is almost epizoötic, or in certain operations and wounds of the extremities, which are frequently followed by tetanus, in addition to the regular surgical treatment. For this purpose Nocard injects under the skin behind the shoulder 10 cc. of anti-toxin serum repeated in two weeks. Let me suggest peroxide of hydrogen as a local dressing in wounds of the extremities in particular. This preparation freely gives off oxygen and the tetanus bacillus, which is confined to the seat of traumatism and does not enter the circulation, cannot live in a medium exposed to oxygen.

PARASITIC ICTERO-HEMATURIA OF SHEEP. *

(Parasitic Red-Water and Jaundice.)

By Dr. W. L. Williams,
Bozeman, Montana.

It has been thought desirable to publish, in brief form, the results of some investigations of a parasitic disease of sheep —hitherto undescribed in America—chiefly with a view to

* Bulletin No. 8. Montana Agricultural Experiment Station.

placing veterinarians and flock-masters on their guard that they may recognize or suspect the nature of the malady when present, and thus lead to a more complete study regarding its extent, cause, nature and prevention.

The investigations conducted by this station were only preliminary and serve only to identify the disease as that described under the name of "Carceag" or "Parasitic Ictero-Hæmaturia of Sheep" in other countries, further study being prevented for the time, by an abatement of the malady which apparently occurs annually in early spring, and partly because the work was undertaken a long distance from the laboratory, with insufficient equipment at immediate hand.

An impression has been formed that the chief losses among sheep in the Rocky Mountain States were due to the larger animal parasites—such as tape worms and the sheep gad-fly (œstrus ovis), or "grub in the head"—and while the impression may be true, it does not apply to Montana; for, so far as this station has been able to learn, greater losses have occurred during the past four years from *ictero-hematuria* in one little valley, than has been produced by the larger animal parasites in the balance of the State.

While the disease so far as recognized is apparently local, if we are to judge from the losses hinted or recorded among sheep in other Rocky Mountain States, it is not improbable that this disease exists as a serious scourge in other similar localities.

The disease is due to a microscopic animal parasite very similar in many respects to the parasite of Texas fever of cattle, and has been found in the blood, urine, liver, spleen and kidneys.

The attention of the station was first called to this malady in a note addressed to the Veterinarian, under date of January 25, 1895, by T. Clowes Miles, Esq., of Silver Bow, who stated that for some three years a peculiar and fatal malady of sheep had existed in his vicinity which he believed was a disease "of the kidneys, gall and liver."

The disease seems to have attracted the official attention of the State Veterinarian as early as 1892, who, in his report for that year, refers to an outbreak of "anthrax" among sheep in the Deer Lodge Valley, without appending any description of the disease as observed, or in any way giving his grounds for diagnosis, while the sheep owners claim that the same disease

investigated by this station has recurred annually since 1891, and that it is identical with the malady described as anthrax in 1892.

Later, the matter was referred to the Bureau of Animal Industry of the U. S. Department of Agriculture, and by their advice it was eventually brought to our attention, and a personal visit was made to the infected locality in Deer Lodge and Silver Bow valleys on March 25, this year (1895).

The history of the disease, as related by the sheep owners, dates back to 1891. Since that time it has appeared annually in a district covering about 300 square miles, comprising the upper portion of the Deer Lodge valley, the lower portion of Silver Bow valley, and the surrounding foot-hills and mountains.

Sheep grazing was begun in the infected area early in the settlement of the territory, sheep having been brought to the valley as early as 1875. All the losers in the recent outbreak engaged in the industry prior to 1882, their flocks remaining quite healthy, their losses being confined to occasional deaths from the larger animal parasites and accidental diseases; until in 1891, when a fatal epizoötic appeared almost simultaneously in four or five large flocks of 2000 to 10,000 each, since which time the losses have been very serious, averaging, as nearly as can now be learned, about 2000 sheep annually, more than 80 per cent of which may be safely attributed to this affection.

The losses were so serious that one of the largest owners disposed of the entire remnant of his flocks after some two years. Another has just sold his entire flock to butchers, and still other losers have greatly reduced the remnants of their flocks by selling to butchers all animals apparently fit for mutton, so that there are now grazed in the infected territory less than twenty per cent of the number kept there in 1891.

The Deer Lodge valley and its tributary the Silver Bow, situated on the Pacific slope of the Rocky Mountains, has an altitude of a little more than 5000 feet, with the mountains on either side extending 500 to 1500 feet higher. The valley soil is highly alkaline, the alkalinity at some points preventing the growth of vegetation. In some places it is boggy, but generally dry, semi-arid, rendering irrigation necessary for the production of hay and cereals.

In winter the sheep are fed on hay cut from these valley-lands, or grazed upon the meadows, and watered from the

valley-streams; while in summer time they are grazed in the foot-hills and mountains, and watered at mountain springs, which are usually surrounded by alkaline bogs.

The smoke from extensive copper smelters in the cities of Butte and Anaconda is habitually carried by the wind over into the infected area, leading some sheep owners to attribute their losses to smelter fumes. But the smelters had existed for eight or ten years before the malady appeared, and even now only sheep and goats are affected while other animals in the same district remain healthy.

The disease generally appears late in autumn, long after mountain grasses have ceased to grow and are wholly dried up, except in the alkaline bogs about the springs, and rages somewhat seriously for a time, then abates during the cold winter months to again become more severe in late winter and early spring, then disappears until the following autumn.

Symptoms.

At the first objective signs of the disease, the sheep drops behind the flock, ceases to graze, moves unsteadily, with back arched, and appears listless.

The symptoms develop rapidly, a moderate fever is present, and the shepherd soon notices characteristic changes in the urine, which assumes a distinctly reddish, bloody or reddish-brown color. The visible mucous membranes are quite yellow, and in well-marked cases, if the fleece be parted, the skin is found to have a well-marked yellow color, indicating severe jaundice.

Dropsical swellings are occasionally seen on the sides of the head and neck. The patient lies down most of the time, in a crouching position. In those cases where the disease has become well developed and the red-water and jaundice are plainly present, it appears to prove universally fatal, death ensuing within one to five days after the first symptoms are observed.

Death is usually preceded by collapse continuing for several hours; at times, however, convulsions may occur in the last stages of the affection.

It seems that not all affected sheep show evident signs of the disease while alive, as it appears that many of them, which were slaughtered by local butchers, were in apparent health,

and the evidences of disease passed unnoticed until after slaughter, when the general jaundice was so evident as to lead the butchers to denominate the affected flocks as the "gold brand" sheep.

Post-mortem examinations upon the bodies of ten sheep, some recently dead, others killed when in the last stages of the disease, revealed quite uniform pathological changes.

The degree of emaciation or fatness varied, but generally no marked emaciation was present. Most of them were moderately, others decidedly fat.

It appeared that emaciated sheep were most likely to escape infection, and that those in moderate or high condition succumbed too quickly to the malady to lose much in flesh.

The skin, connective and adipose tissues throughout the body had a very marked yellow color, at times pale, at others a bright almost lemon color. *The muscles* were pale, soft, faintly yellowish.

The blood in sheep which had recently died was found thin; only feebly if at all coagulated, and quite pale in color. When animals in the last stages of the disease were killed by bleeding, the escaping blood was found very scant, thin, watery (coagulating feebly, if at all), pale, and differing in acute cases from the pale blood of ordinary anemia by assuming a light, dirty, grayish-red color.

The digestive organs offered nothing special, containing little food, as a rule, and partaking to a moderate degree in the general yellow color.

The liver, when showing deviations from the normal size, was a little contracted, weighing two to two and one-half pounds in sheep forty to sixty pounds weight; the jaundice, so common throughout the body, was especially marked in the liver, the color varying from a pale yellow to yellowish-brown externally, while internally it presented a brighter yellow, at times almost orange-color. A cut surface is smooth, very moist, the lobuli appearing very distinct. The liver substance is very friable, and, upon breaking, the lobuli are yet more apparent than upon the cut surface. The gall bladder is usually found well filled, frequently distended with a yellowish-green, or more often chocolate-colored or green-black, thick, flocculent bile.

The kidneys are very much enlarged, weighing twelve to sixteen ounces or more, the capsule easily detached, the parenchyma dark, dirty-black or blue-black, soft, easily torn, and when cut, large quantities of bloody or chocolate-colored urine oozes from the cut surface upon very slight pressure.

The urinary bladder is in some cases empty, more generally filled with bloody or chocolate-colored urine.

The ventricles of the heart are in some cases filled with imperfect blood clots, in others empty. The pericardium and endocardium are frequently ecchymosed. In one case the pericardium contained a firm gelatinous clot of a bright-green color one inch long by one-half inch thick, and in the same case there was a considerable effusion of green serum above the left kidney.

Effusions in connective tissue spaces in various portions of the body are not uncommon; generally of a yellowish or yellowish-green color, and occurring most frequently along the sides of the head and neck, on the inside of the thighs, or within the body cavity.

The spleen appears contracted, more spherical than usual, weighs two to three ounces, firm, pulp dark reddish-brown.

The long distance from the laboratory and insufficient apparatus carried, prevented an extended microscopical study of the disease, confining the work almost wholly to the fresh blood.

The examinations were made with a Zeiss one-twelfth homogeneous immersion objective, ocular three.

The first marked change noted in the blood was a great decrease in the number of red blood cells and a corresponding increase of the white cells—there being one of the latter to four or five of the former.

The red cells were very much enlarged, swollen, turgid, their borders irregular, crenate; they were no longer bi-concave, but bi-convex, or spheroidal. Their usual sharp contour was wanting, their appearance dull, lustreless, and although some examinations were made as quickly as possible after withdrawal of the blood from the vessels of living animals, no movement of the cells could be seen. Within the red blood cells were seen numerous round, oval or sometimes oblong and curved bodies one-tenth to one-sixth the diameter of the red blood cells. In some of these cells but one of these bodies was to be seen, in others there were two to four, some apparently in process of

division. These bodies were motile at time, moving from one portion of the blood cell to another, either across its surface or from the surface into the interior. Some parasites were seen free in the blood serum, others could be seen leaving the blood cells, becoming free in the serum, while still others could be seen entering the cells from the serum. These bodies readily stained with anilin red and methylene blue.

This affection has been but recently described, and, so far as known, by but two observers. The parasite seems to have been first discovered by Professor V. Babes of Bucharest, Roumania, in 1888 (Virchow's *Archives B.* 139 S. 384); and the histological changes described by him in 1889 (*Ib.* 1889); and in 1892 (*Compte rend. de 1, Academie des Sciences*) he described the parasite as one apparently occupying a middle ground between bacteria and protozoa. Professor Babes denominated the disease "Carceag." His efforts at cultivation of the parasite were followed by negative results.

We next find the disease described in 1895 by Professor Dr. A. Bonome (Virchow's Archives Band 139, S. I.) of the Royal University at Padua, Italy, as Parasitic Ictero-Hematuria of Sheep.

The symptoms and post-mortem appearance as seen by Dr. Bonome are identical with those recorded above as seen in this State.

The microscopical appearances noted in the blood of the affected sheep in the Montana outbreak are also fully identical with those observed by Dr. Babes and Dr. Bonome in Roumania and Italy.

Dr. Bonome made a careful study of the disease in the living animal at his laboratory, and in addition to the points included in our investigation, made and extended microscopical study of the liver, spleen, kidneys and urine, besides making ineffectual attempts at experimental transmission of the disease to healthy sheep, by means of the transfusion of blood from those affected.

The most noteworthy changes observed by Dr. Bonome in any organ were those of the liver, in which the hepatic cells early undergo necrobiosis, some are swollen, turgid, yellow and without nuclei; in others nuclei are to be seen, affected with dropsical effusion. The affection of the liver is general and severe, large sections showing no unaffected liver lobuli;

some were even completely destroyed, leaving a cavity filled with cell debris.

The parasites were numerous in the liver, invading the cells and appearing among the cell debris in the intra-lobular veins and the bile capillaries.

The spleen seemed especially rich in parasites, they being found in abundance in the contained red blood cells, in the pulp cells and in a free state.

In the kidneys he found the epithelial cells lining the tubuli in a state of fatty degeneration. In the glomeruli the arterial loops were in many cases distended and blocked up by emboli of red blood cells, other loops were destroyed by the emboli and in some cases almost the entire glomerulus was destroyed and the cavity occupied by detritus consisting of the remnants of the arterial loops and broken-down red blood cells. Dr. Bonome regards the parasite as essentially animal in character, allied somewhat to amœba, resembling in other respects sporidium.

While it is not probable that this disease will ever become widespread in this country, the losses in Deer Lodge Valley indicate clearly that in an infected locality it may prove a most disastrous scourge to flocks, and we feel that the publication at this time of this preliminary description of the malady is warranted in order to direct the attention of veterinarians, and flock owners to the subject, that in case of future outbreaks its real nature may be recognized or suspected and reported for further study, to the end that means for its prevention and eradication may be found.

The station desires that future outbreaks of disease among sheep, presenting symptoms identical with or closely similar to those above related, be promptly reported to the veterinarian.

EDITORIAL.

UNITED STATES VETERINARY MEDICAL ASSOCIATION.

The thirty-third annual meeting of the United States Veterinary Medical Association, as previously announced in these pages, was held September 10, 11 and 12, in the State Capitol Building, Des Moines, Iowa. In some respects it was a decided success, while in others it was perhaps somewhat indifferent. The Iowa State Veterinary Association meeting was held on the ninth, and the veterinarians from this as well as from a number of others of the central Western States attended in good numbers. It is to be regretted that only a handful of the members of the profession from the East, and especially from our larger cities, found matters such that they were able to attend. However, the condition of the country was such as to make this perhaps an off year and militate against the total attendance.

The first day and a part of the second were occupied with the reports of committees, while the remainder of the time was occupied with routine business and reading of papers. The educational part of the program was exceptionally good, and from this standpoint the meeting was a decided success.

The reports of the committee on diseases were evidence of the pains taken by the members; however, they were too comprehensive and voluminous to be thoroughly discussed. A short paper well discussed is more instructive than one that is long and disposed of without discussion.

The discussion of tuberculosis, unfortunately, was rather an account of personal reminiscences and a repetition of facts already well known, while little time was devoted to the practical methods of handling and eradicating the disease.

However, without being too critical, we may say that every one acquitted himself creditably, and all felt that the meeting had more than fulfilled anticipations. The local committee, as well as the other veterinarians of Iowa, admirably succeeded in entertaining their colleagues, and made their visit very pleasant. We believe that the territory within which the meetings of this association are held, should not be

small. An occasional invasion of a new territory will add new recruits, enlarge the field of scientific veterinary medicine, and infuse enthusiasm.

The annual banquet on the evening of the twelfth was attended by about forty members, who were served with a bountiful collation. The entertainment included a number of earnest and witty speeches, addressed in response to toasts. Among those present were Mr. ———, the Governor's private secretary, and Congressman ———, of Iowa, who made appropriate addresses complimenting the position of the veterinarian.

The papers and reports read during the course of the meeting will appear in the MAGAZINE and in the other veterinarian periodicals.

We must give a word of explanation in reference to the publication of papers read before the United States and the Pennsylvania State meetings held in September, in the August number of the MAGAZINE. This is due to the fact that, for reasons previously explained, this number has been printed late—at a time when the September number should have been issued.

TRANSLATIONS.

NEURECTOMY: INDICATIONS AND CONTRA-INDICATIONS.

By Frick.

[Translated by John W. Adams.]

[Continued.]

The causes of these results of neurectomy are, as previously stated, to be found in the absence of nerve influence; of course, the accompanying diseases of the foot which have just been mentioned, have their own individual causes, for example, a penetrating wound of the foot must needs have been caused by a penetrating body.

In conclusion, there is still to be considered an alleged consequence of neurectomy which Very claims to have observed, namely, that after this operation trotting horses lose much of their speed. While from a purely theoretical standpoint we might admit such a possibility, especially when we reflect that saddle horses sometimes assume a hard, hammering gait after neurectomy, yet experience has shown that Very's supposition is erroneous. Möller has especially emphasized this fact, and my own experience leads me to agree with him.

From what has been said the contra-indications of neurectomy are self-evident, and may be briefly dismissed as follows:

Neurectomy is contra-indicated in any horse where there are conditions present that are favorable to any of the unfortunate terminations previously mentioned. Neurectomy is, therefore, especially to be avoided:

1. When there are acute inflammatory diseases within the region benumbed by the neurectomy (corns, suppurative processes, wounds);

2. When there are present chronic diseases that may become acute and destructive after neurectomy (fistula, cracks in the hoof, marked contraction of the hoof);

3. When the hoof presents such defects as might readily expose it to injury (flat sole, dropped sole, long-toed hoof with low and poorly developed quarters, thin wall) ;

4. When there are excessive demands upon the flexor apparatus (heavy draft horses, weak and low fetlocks, hard and mountainous roads, high action, fast gaits, heavy loads) ;

5. When the shoeing will be neglected or unskillful, or the hoof not given proper care.

There will be times in practice when the veterinarian will feel compelled to perform this operation, in spite of these contra-indications, and in this event he should be very careful not to commit himself as to the probable outcome. Under such conditions neurectomy is a mere chance procedure for whose result the operator has no responsibility ; therefore, under such unfavorable circumstances he must not hesitate to decry the operation, if he would avoid censure should the result be disappointing.

If we now undertake to form an opinion as to the value of neurectomy from a consideration of the opinions of the different writers on this subject, we shall see that all are to a certain extent true, but that no one has dealt fairly with both sides of the question. The value of neurectomy depends not so much on chance as upon the contra-indications. The operator who has had disappointing results should ask himself whether he has not disregarded the contra-indications ; while it is more than probable that he who has been especially successful has either recognized the contra-indications and refused to run counter to them, or has been so fortunate as to have had none in his cases.

From the point of view of the contra-indications no general estimate of the worth of neurectomy can be made. Whether, in a given case, the operation will be of value or not will depend entirely upon a careful estimation of all those conditions which we have pointed out as indications and contra-indications. Our conclusion is, therefore, that neurectomy, depending upon the nature of each case and its accompanying conditions, which in each case must be carefully ascertained, is either a valuable surgical procedure, or else one fraught with many disadvantages and much danger.

ANIMAL DIPHTHERIA.

By Léon Gallez.

[Translated by S. J. J. Harger.]

Diphtheria in the Pig.

Diphtheritic sore-throat is common in the pig. There is difficulty in swallowing, painful respiration, often symptoms of paralysis of the soft palate and sometimes regurgitation of its food through the nostrils.

It is necessary to enter into the details of the symptomatology of animal diphtheria in order to better compare the numerous points of similarity which it has with human diphtheria. The absolute identity of the two diseases on account of a difference in the symptomatology does not rest upon any serious basis. The existence of differences is very evident, but would it not be remarkable that organisms as dissimilar as that of the chicken or the pigeon, for example, and that of man should react in an identical manner from the action of the same pathogenic agent? Do we not see in man himself, under certain conditions, different phenomena from the action of the same microbe?[1] In how many different modifications does the action of the coli bacillus, for example, reveal itself in the human species?[2] Does not actinomycosis present itself in different forms in man and in the ox? Nevertheless, the identity of the disease and its pathogenic agent in the two cases is not doubted.[3]

If the similarity of the symptoms in the two diseases is not absolute it can not be inferred that it is not a question of one and the same affection. The mere fact of an essential difference in the organism that is diseased evidently suffices to explain the dissimilarities which exists in the manifestation of the morbid processes.

Do we not, in both cases, observe the same essential phenomena: primary localization of the disease, subsequent infection

[1] Selthil. "Traité de la diphtérie," 1891, p. 619.
[2] See, "La Semaine médicale," 1895, No. 1.
[3] *Ibid.* 1895, No. 3, p. 23.

and finally paralysis? Besides, by comparing the numerous points of resemblance between the two diseases, one can readily decide upon their analogy, not to say their identity.

Let us first study the *pathological anatomy.*

Human Diphtheria.	Animal Diphtheria.
More or less extensive centres of broncho-pneumonia or pulmonary congestion; also emphysema.[1]	Often tracheo-bronchial catarrh and diffuse catarrhal pneumonia; pulmonary edema or atalectasis.[2]
Nearly always more or less abundant serous exudation in the pericardium. Sub-pericardic ecchymoses are not rare.[3]	Cellulo-fibrinous pericarditis with sub-pericardic ecchymoses.
Diphtheritic endocarditis has been admitted by Bouchut[4] and by Labardie-Lagrave.[5] After these authors, diphtheria causes fibrinous concretion and miliary vegetations which cover the internal surface of the valves.	Cardiac fibrinous deposits quite frequent in birds.[6]
Granulo-fatty degeneration has been found in the muscle of the heart and in the pharynx.[7]	This degeneration has been found, by Léniez in examining the cadaver of chickens and turkeys, but these lesions do not exist in the muscles in the region of the breast.
The false membrane is composed of fibrin, forming a network of variable thickness and of cells. (Migratory lymphoid cells, red corpuscles and modified epithelial cells.)	The false membrane is produced by a fibrinous exudation containing pus-cells, round cells resembling leucocytes, pavement epithelial cells (Friedberger).
The bacilli form an interrupted layer on the surface, often constituted by a mixture of cocci, streptococci and islands of bacilli. Islands of isolated bacilli are found in the thickness of the mucous membrane.	The bacilli constitute a layer in the false membrane or in its interior in the form of masses and isolated or aggregated islands (Cornil and Megnin). They are abundant in the superficial portion of the false membrane and rare or absent in the deep layers; other micro-organisms, besides the bacilli are found (Moselman and Linéaux.)

[1] "Traitement de médecine de Charcot, Bouchard and Brissaud," vol. iii, p. 187 and 190.

[2] "Friedberger and Fröhner. Special Pathology et Therapeutics.

[3] "Traité de médecine de Charcot, Bouchard and Brissaud, vol, iii p. 187 and 190.

[4] Bouchut. "De la myocardite et l'endocardite dans l'angine cauenneuse et le croup. (*Gazette des hospitaux*, 1872.)

[5] Labardie-Lagrave. "Des complications cardiaques du croup et de la diphtherie." (*Thése de Paris*, 1873.)

[6] Léniez, Loc. cit.

[7] Callandreau. Contribution to the study of croup. (*Thése de Paris*; 1873.)

Human Diphtheria.	Animal Diphtheria.
The blood has a black tint,	Brown or black coloration of the blood. (Léniez.)
The mucous membrane of the intestines is infiltrated with embryonic cells, Peyer's patches and the closed follicles are tumefied and hypertrophied.	Catarrhal enteritis with marked infiltration of the mucous membrane (Friedberger and Fröhner). Zürn has found the cecum and rectum filled with a yellowish exudate strongly adherent to the mucous membrane; the latter is often ulcerated.
The liver is congested and augmented in volume (Morel); the hepatic tissue is the seat of fatty infiltration.	Parenchymatous enlargement of the liver is not rare. (Friedberger, etc.)
Bault[1] and others admit the possibility of uremic complication in diphtheria from complete anuria; this should indicate a parenchymatous nephritis.	Parenchymatous nephritis has been observed by Léniez in diphtheritic birds.

Comparative Symptomatology.

I have sufficiently detailed the symptoms of animal diphtheria without reviewing them here, and I will limit myself to calling attention to some of the principal signs which establish the analogy of this disease in animals and in man.

The period of incubation is the same in both cases: two or three days.

In animals, as in man, the disease first shows local lesions which may primarily involve the different mucous membranes and the skin: buccal, pharyngeal, nasal, oculo-palpebral, intestinal and cutaneous diphtheria exists in animals as well as in man.

The immunity of the mucous membrane not exposed to the air against the false diphtheritic membrane has been noticed in man by Empis[2] and Isambert[3] and has been experimentally proved by Nicati and Piana in birds and rabbits.

Birds as well as children may readily recover from a superficial patch; the cutaneous form of some pigeons and the ordinary "pip" in chickens are examples (Léniez) and even in man the small exudate of the amygdalæ.

---

[1] Société de biologie, 1880.

[2] "Empis Etudes sur la diphterie" (*Gazette medicale*, 1850.)

[3] Trambert. Des affections diphteritic, etc. (*Archives Générales de médicine*, 1852.)

In both cases the false membrane has a tendency to spread and in both its extension to the larynx, which is equally fatal, is frequently noticed.

The false membrane in man, according to Lorain[1] may involve the greater angle of the eye; the conjunctiva is very much injected, the eyelids swollen, and a yellowish secretion discharges. There results also, from occlusion of the lachrymal duct, excessive discharge of tears which is never absent in this case. Sloughing of the cornea with perforation, hernia of the iris and sometimes panophthalmia occur. What difference is there between this symptomatology and that of the ocular form of diphtheria of animals previously described?

Wounds occurring in diphtheritic subjects, whether man or animals, are readily covered with false membranes.

The general intoxication of the system is also seen in birds. Léniez has found in the autopsy of birds a pharyngeal exudate not very extensive and not obstructing the digestive passages; the subjects died from systemic infection.

Paralysis is observed in the diphtheria of both man and animals; the same can be said of *deafness* and ganglionic enlargement.

Hemorrhage has been observed in the infectious form of diphtheritic angina, and in particular epistaxis[2]. Léniez has found in diphtheritic birds hemorrhage of the nose and beak.

Cardiac and even renal complications are observed in both cases; albuminuria is also quite frequent in man and we have seen it in diphtheria in the dog.

The mortality is as great in animals as it is in man.

As in man, animal diphtheria preferably attacks young animals and spares the adult as well as the sucking animal; very young birds are more rarely affected.

Epizoötics and epidemics of diphtheria are more frequently observed during the period from November to May.

Finally, in both cases the principle of treatment is identical: destruction of the primitive local lesion. The treatment most frequently employed for this purpose consists of perchloride of iron, tannin, corrosive sublimate, lemon juice, turpentine, fumigations of tar, etc. It is seen that the analogy of the two

[1] Lorain, "Article Diphtéric in Nouveau dictionnaire de médicine et de chirugie pratiques."

[2] See *Traité de medecine*, vol. iii, p. 207.

diseases can be even extended to their treatment. It would be interesting to experiment with serum-therapy in diphtheritic animals.

Observations.

The idea of the identity of human and animal diphtheria is not new.

History mentions the epidemic of Naples in 1618 and that of Paris in 1743, followed by others of a similar nature. In Italy entire flocks die from it, and the herdsmen who eat the meat succumb and show the same symptoms as the animals.

Since the beginning of the present century, the Academy of Medicine of Paris, before which the question was discussed, appointed a commission for the purpose of studying in Solagne the mode of transmission of diphtheria from animal to man.

I have collected the most conclusive observations pertaining to the mode of transmission or contamination from man to animal and vice-versa.

A. Observations of Human Diphtheria to Animals.

Observation 1.—Sanderson[1] related the following:

Three pigs had access to a repository where were deposited the excretions of several diphtheritic patients; they died rapidly, and in the pharynx were found the specific membranes with swelling of the sub-maxillary glands.

Observation 2.—A grey-hound was affected with symptoms quite similar to those of diphtheria, four days after having ingested the excrement from an infant, succumbed to this disease. Characteristic membranous exudate was found at the autopsy. (Bossi[2]).

Observation 3.—Wheeler[3] reports a case presenting the following phenomena: absolute inability to swallow, pendulous tongue, mouth much inflamed, gums hemorrhagic, bloody diarrhea; temperature 39.4°. As a case of diphtheria in a child had existed in the house some time before, Wheeler concluded to make cultures from the products in the upper part of the mouth. These cultures *undoubtedly* consisted of the bacilli of Klebs—Löffler.

---

[1] Cited by Delthil, loc. cit., p. 619.

[2] *Ibid.*

[3] Veterinary Magazine, Aug., 1894.

Observation 4.—On February 18, 1886, Delthil[1] was called into a family in which a young child, aged twenty months, was affected with grave diphtheria that terminated fatally. After some attempts at vomitings the diphtheritic substance was expelled. These dejections were continually thrown into the poultry-yard not far from the house, where these fowls could pick them. An epizoötic of diphtheria affected all the animals afterward.

Observation 5.—In an isolated habitation in a forest, Formad[2] mentions four infants affected with diphtheria. Several pigs which had been fed on the refuse from the house became diseased and one of them died. Formad found at the autopsy absolutely nothing in the larynx and the other air passages, but the inferior part of the esophagus, stomach, and the superior part of the duodenum were covered by a very thick membrane composed of the anatomical elements of a veritable false membrane containing micro-cocci. Inoculation of rabbits reproduced the local symptoms and the general phenomena, followed by death, similar to those which are obtained with the exudate of human diphtheria.

Observation 6.—Dr. Roth treated at Kitzingen two children in the same family, suffering from scarlatina complicated with diphtheritic angina. The epidemic scales falling on the floor had been thrown with the sweepings upon a heap of manure frequented by thirty-six hens and chicks. In a few days ten, and shortly afterward the thirty-six hens and chicks became sick ; loss of appetite, difficult respiration, eyelids, nictitans, buccal and nasal mucous membrane tumefied and coated with a viscid, caseous mass strongly adherent ; the exudate entered in the pharynx which exhaled a fetid odor ; in one hen suppurative ulceration of the eyelids and perforation of the cornea were seen ; the crest was flaccid and gradually assumed a dark, blue-black coloration, the feathers erect, the tail and wings drooping. The animals became emaciated and slowly died from marasmus—mortality 44 per cent. In spite of a thorough disinfection, some of the new hens subsequently introduced contracted the same disease in two or three weeks, but recovered.

---

[1] Delthil, loc. cit., p. 625.

[2] Formad, "Medical Times," Phila., 1881-82, vol. xii, p. 497.

Observation 7.—Nesti[1] saw a dog, licking the sputum of an infant suffering from diphtheria, die four days later with symptoms of suffocating croupal angina.

Observation 8.—An observation anolagous to the preceding is reported by Dr. Rose Carmack[2].

Observation 9[3].—This epidemic, a very grave one, had been raging in the suburbs of Lille, in Tournai, in May, 1889, to the beginning of 1890. Up to March 22, 1890, nineteen deaths had occurred. A number of families were affected. In one instance, the mother bought a pigeon to be eaten by her young child, which had almost recovered from the disease. The child, not willing to kill the pigeon, played with it and very soon the pigeon showed symptoms of diphtheria and died two days afterward.

B. Observations of Transmission of Human Diphtheria to Animals and Re-transmission to Man.

Observation 1.—A small epidemic of diphtheria visited the garrison of Sebdon during the latter part of 1890. Its origin was readily discovered: The first two patients belonged to a company which had had diphtheria two months before at Nemours; two other soldiers were contaminated by the latter, of these four, one died. On the same place and a short distance from the hospital there was a hennery, the poultry being fed by one of the nurses: ten chickens became diseased, presenting grayish-white patches upon the soft palate and the pharynx; the nasal fossae were filled with an ichorous discharge which adhered around the nostrils; the eyelids were infiltrated and the conjunctiva covered with a thick exudate, great prostration, etc. Five of these animals died from undeniable diphtheria, which was also confirmed by Professor Arloing. But the proprietor of this hennery who had often visited it and opened the beaks of the hens to remove the false membranes, was taken off with diphtheria. During this interval a soldier arriving from El-Aricha, was taken to the hospital and died from specific pseudo-membranous angina. Diphtheria

---

[1] Nesti, "Le Sperimentale," 1872, vol. xxx.
[2] Rose Carmack. *The Lancet*, Apr. 24, 1875.
[3] Communication from Dr Schrevens, Tournai.

again broke out among the hens in El-Aricha, which had been sent there, but had previously been kept for a few days in the infected hennery at Sebdon. (Debrie.)

Observation 2.—At Enfield[1] in 1888, a child suffered from diphtheria and the matters vomited were lapped up by a cat in the same house. This cat became sick with symptoms so similar with those of the child, which in the mean time had died, that it was destroyed. But before being killed it was penned up in a small yard, coming in contact with other cats. One of the latter, that of a neighbor, became sick with the same symptoms and was cared for by the four children in the house in which it was a favorite. *All four* were affected with diphtheria, and to the knowledge of the mother the children were not exposed to any other source of contamination.

Observation—3. In 1876, Dammann[2] saw twenty calves affected with an epizoötic of diphtheria. Two days after making an autopsy in a diphtheritic calf, he was taken with a swelling of the throat; three other persons who had cared for these animals were also attacked with a violent catarrhal angina and one of them with a diphtheritic false membrane. The epizoötic had originated immediately after a child on the farm had died from diphtheria.

PENNSYLVANIA STATE EXAMINING BOARD FOR VETERINARIANS.

Governor Hastings has appointed the following State Board of Veterinary Examiners, their terms commencing the first Monday in September, 1895: W. H. Hoskins, Philadelphia, three years; Simon J. J. Harger, Philadelphia, three years; J. C. McNeill, Pittsburg, two years; H. Walters, Wilkesbarre, two years; J. W. Sallade, Pottsville, one year. This Board will examine all applicants for permission to practice veterinary medicine and surgery in the State.

---

[1] *Sanitary Record*, 1887–88, p. 553.

[2] Dammann, Deutsche Zeitsch. f. Thiermed. u. Vergleich. Path. vol. iii. p. 1.

COMMUNICATION.

POSOLOGY OF BELLADONNA AND ITS ALKALOID IN SIALORRHEA.

In looking over the July number of the VETERINARY MAGAZINE I noticed an article entitled "Essential Sialorrhea" in which a case is cited of a horse having no other symptom than an abundant flow of saliva. The case was treated with hypodermic injections of atropin sulphate in large doses, so large indeed, that the next day the animal was suffering from acute atropin poisoning and had to be treated for it by hypodermics of pilocarpin. He subsequently recovered. The author finishes his article by saying that he "considers the posology of most of the alkaloids fixed by authors of treatises on therapeutics too small."

On September 18, '95, the writer was called to see a sorrel mare, used for draught purposes, property of Mr. John T., and found her standing with head somewhat extended, eyes staring and the saliva flowing from the *mouth* in profuse, ropy streams. Examination showed no stoppage in the esophagus, in fact the animal readily drank half a bucket of water. A diagnosis of sialorrhea due to some gastric disturbance was made, and the following prescription ordered:

℞

Extr. bellad. fl	100.0
Tr. nucis vom.	50.0
Tr. gent. co.	50.0
Ol. lini. q. s. ut ft.	300.0

Sig. Give two tablespoonfuls every half hour.

Before the fourth dose was given the flow of saliva had lessened, and inside of three hours the symptoms had entirely disappeared and the mare was calling for her feed. There were, of course, no bad results following the administration of such doses of belladonna, and the recovery was complete.

The writer of this article, while far from being a believer in homeopathy or anything pertaining thereto, hardly agrees with the author, quoted above, in reference to the size of the doses

of the alkaloids and alkaloidal drugs. Is it not far better to prescribe moderate, repeated doses, than to administer such unreasonable amounts as 0.75 gm. of atropin sulphate at one time, subcutaneously, thereby producing toxic symptoms which endanger the life of the animal more than does the original disease.

E. Stanton Muir, V. M. D.

Advertising Rates in Veterinary Magazine

Full page (ordinary)	3 mos., $15.00	6 mos., $30.00	1 year, $50.00
½ " "	" 10.00	" 20.00	" 30.00
¼ " "	" 6 00	" 10.00	" 15.00
Inside Front Cover	3 mos., $27.50	6 mos., $50.00	1 year, $80.00
½ " "	" 15.00	" 27.50	" 45.00
¼ " "	" 9.00	" 15.00	" 25 00
Inside Back Cover	3 mos., $20.00	6 mos., $37.50	1 year, $70.00
½ " "	" 12.50	" 22.50	" 40 00
¼ " "	" 8.00	" 12.50	" 22.50
Outside Back Cover	3 mos., $30.00	6 mos., $55.00	1 year, $90.00
½ " "	" 16.50	" 30.00	" 50.00
¼ " "	" 10.00	" 17.50	" 30.00

United States College of Veterinary Surgeons

222 C STREET, N. W., WASHINGTON, D. C.

Session 1895-6
Begins October 1st.

For Prospectus and Full Information, address

C. Barnwell Robinson, V. S., *Dean.*

WELLCOME LIBRARY INSTITUTE

Pathology and Therapeutics of Domestic Animals,

By Dr. Friedberger,
Professor of Veterinary Medicine in the School at Munich,

And Dr. Fröhner,
Professor of Veterinary Medicine in the School at Berlin.

Translated from the most recent edition with annotations

By Prof. W. L. Zuill, M. D., D.V.S.,

Late Professor of Surgery and Obstetrics in the Veterinary Department of the University of Pennsylvania, Member of the Academy of Natural Sciences of Philadelphia, Member of the United States Veterinary Medical Association, Member of the Philadelphia County Medical Society.

Together with the Notes of the French Translators, and Selections from those of Prof. Trasbot.

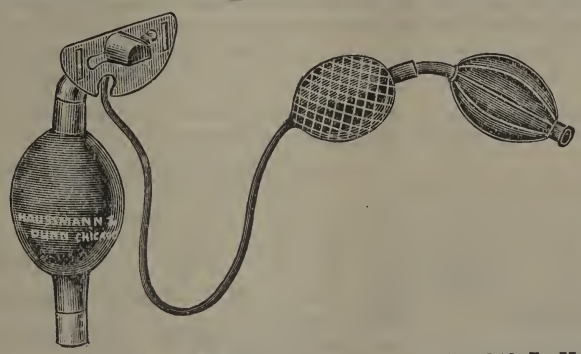
In Two Volumes of about six hundred pages each.

Price, $6.00 (Cloth Binding.) **Per Volume, net.**

Orders will be filled by the Publisher, W. L. Zuill, 857 N. Broad Street, Phila.; or by W. J. Dornan, Printer, 100 N. Seventh St., Phila.

Awarded First Prize World's Fair on

VETERINARY INSTRUMENTS



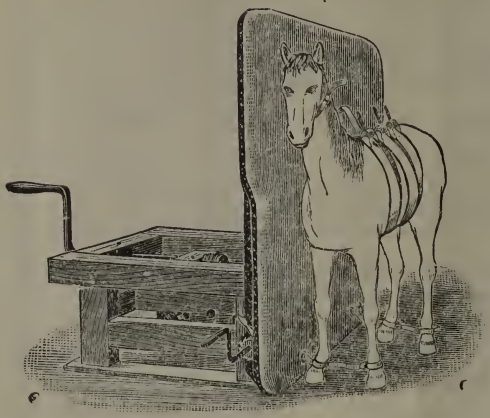
Haussman & Dunn,

211-213 E. Madison Street, CHICAGO.

Manufacturers of Prof. Simon J. J. Harger's Arytenectomy Set. Ecraseurs, Slings, Trocars, Etc.

Write for Catalogue.

Price's Operating Table



Is the Only... Table

that is capable of handling all kinds of horses with ease and without danger to either the horse or operator.

Send for Descriptive Catalogue to **D. R. Price,** *CAMBRIA, Wis.*

TESTIMONIALS.

CHICAGO, FEB'Y 22, 1892.

D. R. PRICE, D. V. S., Cambria, Wis.

DEAR SIR: It gives us sincere pleasure to testify to the merits of your excellent operating table. We have had two of them in continuous use here in the college building, for the past four years, so that we are competent to judge. During that time we never have had an accident in connection with their use. We recommend your table to practitioners who appreciate safety and comfort in operating.

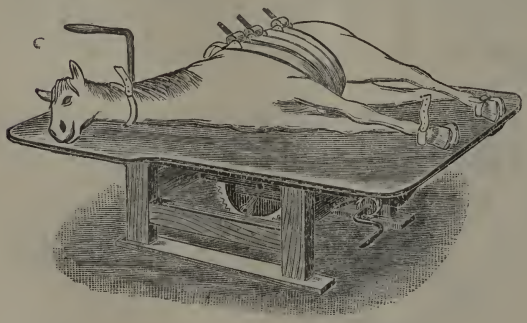
Yours truly, JOSEPH HUGHES, M. R. C. V. S.,
Sec'y Chicago Veterinary College

I cheerfully recommend your operating table to the profession. I am satisfied it is the best in use.

Yours respectfully,
F. J. TUSSAINT, State Veterinarian of Wisconsin.

Dr. Greely, of San Francisco, Cal., says:

"I have put on my table 1,500 horses in a year, and I have my first to hurt."



IT IS USED IN:

Chicago Veterinary College,

State Agricultural College, Texas,

Iowa Agricultural College,

Agricultural College of South Dakota,

Veterinary Dept., University of Penna.

McGILL UNIVERSITY,

Faculty of Comparative Medicine and Veterinary Science,

LATE

MONTREAL VETERINARY COLLEGE.

The Principal (*ex-officio*):

SIR W. DAWSON, C.M.G., LL.D., F.R.S.

Professors:

D. McEACHRAN, F.R.C.V.S., V.S., Edin., D.V.S., 176 University Street.
M. C. BAKER, D.V.S., 87 Mansfield Street.
CHARLES McEACHRAN, D.V.S., 909 Sherbrooke Street.

Associate Professors:

G. P. GIRDWOOD, M.D., 82 University Street.
GEO. WILKINS, M.D., 896 Dorchester Street.
D. P. PENHALLOW, B.Sc., 111 Union Avenue.
WESLEY MILLS, M.A., M.D., D.V.S., 122 Lansdowne Avenue.
A. D. BLACKADER, B.A., M.D., 236 Mountain Street.
J. G. ADAMI, M.A., M.D. [Cantab.], McGill University.

Dean: D. McEACHRAN.

Registrar: CHAS. McEACHRAN.

SESSION 1895-6.

Opens First Week in October.

The complete course of study in this Faculty extends over three years. Graduates of recognized Medical Colleges are allowed to present themselves for examination after regular attendance on one full course; graduates of recognized Agricultural Colleges in which Veterinary Science constitutes a branch of study, after regular attendance for two full courses.

McKILLIP VETERINARY COLLEGE,

CHICAGO.

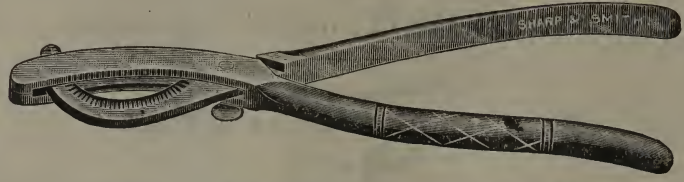
The course of instruction at this College is systematic and thorough, giving a complete professional education. The College is backed by the largest veterinary practice in the country, with the greatest opportunities for practical instruction, while at the same time it pursues the highest scientific work in its bacteriological laboratories for the production of blood serum preparations. The course commences in October and extends over three years with six months duration. Students graduating from this College are eligible to membership in the U. S. Veterinary Medical Association. For catalogue and information apply to

PROF. OLAF SCHWARZKOPF, Dean,
No. 1639 Wabash Ave., Chicago, Ill.

Sharp & Smith

73 RANDOLPH ST., CHICAGO.

Manufacturers of **VETERINARY INSTRUMENTS.**



Sharp & Smith's Improved Emasculator, $8.00.

We carry in stock a full line of Veterinary Instruments, Medicine Cases, and Caponizing Instruments. Instruments made to order. Repairing and Nickel-Plating done on short notice. Send for Catalogue. ...Mention Paper...

University of the State of New York,

NEW YORK COLLEGE OF VETERINARY SURGEONS.

154 EAST FIFTY-SEVENTH ST., NEW YORK.

Chartered 1857.

The Oldest Veterinary College in America.

Abundant Clinical, Pathological and Anatomical Material; a Hospital maintained in connection with the College; new and enlarged quarters for College and Hospital, and a numerous body of experienced instructors, make the course unusually practical and valuable.

The course is graded and extends over three years, of six months each. Lectures begin annually in October. For Circulars address

H. D. GILL, V. S. Dean.

OHIO VETERINARY COLLEGE.

14 and 16 Gano Street. - CINCINNATI.

FACULTY

THOMAS KING, D. V. S., Dean, Professor of Theory and Practice of Veterinary Medicine.

HERMAN BŒHME, D. V. S., Professor and Demonstrator of Anatomy.

JOHN M. SHALLER, M. D., Professor of Physiology and Histology.

FREDERICK KEBLER, A. B., M. D., Professor of Pathology and Bacteriology.

WM. DICKORE, A. M., Ph. D., Professor of Chemistry.

J. FRANCIS, B. Sc., M. D., V. S., Professor of Materia Medica and Therapeutics.

W. R. HOWE, V. S., Professor of Hygiene, Breeding and General Management of Domestic Animals and Ophthalmology.

LOUIS P. COOK, D. V. S., Professor of Surgery.

A. H. LOGAN, V. S., Professor of Obstetrics and Cattle Pathology.

W. W. SYMMES, Attorney-at-Law, Professor of Veterinary Jurisprudence.

Professors HOWE, COOK, and KING, Clinical Instructors.

Application for Catalogues should be addressed to

THOMAS KING, Principal.

Keystone Hoof Dressing Co.,

2303-15 CHESTNUT STREET,

PHILADELPHIA, PA.

The Keystone Hoof Dressing is the most perfect substitute for the natural oil of the hoof. It prevents the development of brittle feet and many cases of lameness. Its continued use does not make the coronary band thick nor the hoof rough.

. . . . PRICES . . . .

Pint, 50c.	Gallon, $ 2.50.
Quart, 75c.	5 Gallons, $12.00.

SPECIAL DISCOUNT TO VETERINARY SURGEONS.

KEYSTONE HOOF DRESSING CO.,

2303-2315 Chestnut Street, Philadelphia, Pa.

UNIVERSITY OF PENNSYLVANIA.

DEPARTMENT OF

VETERINARY MEDICINE.

The course of instruction is graded and extends over three years with one session beginning the 1st of October and ending at Commencement, the second Thursday in June, in each Academic Year.

Practical Instruction, including Laboratory Work in Pharmacy, Chemistry, General Biology, Histology, Physiology, Comparative Osteology, Dissecting, Botany, Pathology, Bacteriology, and Inspection of Meat and Milk, with personal care and treatment of animals in the hospital and clinics, is part of the regular course without additional expense.

Graduates of this School are eligible for membership in the United States Veterinary Medical Association.

FACULTY.

C. C. HARRISON, PROVOST and *ex-officio* President.

HORATIO C. WOOD, M.D., LL.D., Professor of Materia Medica, Pharmacy, and General Therapeutics.

THEODORE G. WORMLEY, M.D., LL.D., Professor of Chemistry and Toxicology.

JOHN GUITÉRAS, M.D., Professor of General Pathology and Morbid Anatomy.

JOHN MARSHALL, M.D., NAT.SC.D., DEAN OF THE FACULTY, Assistant Professor of Chemistry.

SIMON J. J. HARGER, V.M.D., Professor of Veterinary Anatomy and Zoötechnics.

LEONARD PEARSON, B.S., V.M.D., Professor of the Theory and Practice of Veterinary Medicine.

JOHN W. ADAMS, A. B., V. M. D., Assistant Professor of Veterinary Surgery and Obstetrics.

W. S. CARTER, M. D., Assistant Professor of Comparative Physiology.

DEMONSTRATORS.

ALEXANDER GLASS, V. S., Lecturer on the Theory and Practice of Canine Medicine.

ROBERT FORMAD, V. M. D., Lecturer on Veterinary Sanitary Science, and Demonstrator of Normal and Pathological Histology, and of Morbid Anatomy.

EDWIN S. MUIR, PH. G., V. M. D., Instructor in Veterinary Materia Medica and Pharmacy.

B. FRANK SENSEMAN, V. M. D., Demonstrator of Veterinary Anatomy.

JOHN HARSHBERGER, PH. D., Instructor in General Biology, Botany and Zoölogy.

MILTON E. CONARD, V. M. D., Demonstrator of Veterinary Obstetrics.

ARTHUR SALINGER, V. M. D., Demonstrator of Veterinary Surgery.

CLYDE E. FOUSE, V. M. D., Assistant Demonstrator of Veterinary Anatomy.

FRANZ ENGE, Demonstrator of Forging and Horse-shoeing.

For Catalogue, address

JOHN MARSHALL, M. D., Dean,

36th and Pine Streets, Philadelphia, Pa.

THE VETERINARY MAGAZINE.

A Journal for the Practitioner and for the Advancement of Comparative Medicine, Edited Monthly by

Simon J. J. Harger, V.M.D. Leonard Pearson, B.S., V.M.D.,
John W. Adams, A.B., V.M.D.

With the assistance of a large corps of eminent Veterinarians and Physicians,

OFFERS TO VETERINARIANS, STUDENTS OF COMPARATIVE MEDICINE, STOCK-OWNERS, BREEDERS AND HORSE-SHOERS

a complete and accurate record of all the latest investigations in the domain of Practice, Surgery, Zootechnics, Physiology, Therapeutics, Meat and Milk Inspection, Contagious and Infectious Diseases, and Shoeing.

Each number will contain about sixty pages, and illustrations are used where they can be of advantage.

The pages of this Journal are always open to contributions of professional interest. Material for publication should be forwarded so as to reach us by the 15th of the month, in order to insure insertion in the following number. Typewritten copy preferred. Reprints to the number of twenty-five will be furnished contributors, but the application must accompany the copy for insertion.

All communications relating to the Journal should be addressed to

The Veterinary Magazine,

3608 PINE STREET, PHILADELPHIA.

Money orders should be made payable through Station B, West Philadelphia.

Terms: Three Dollars a year, in advance; single copies thirty cents.

EDITORIAL STAFF.

3608 Pine Street,
Philadelphia.

Harvard University,

School of Veterinary Medicine.

The course is a *graded* one of three years of nine months each.

There are unequaled facilities for practical instruction in all branches; and the Hospital, maintained in connection with the School, places a large practice under the constant observation of students.

For Illustrated Catalogue and all further information, apply to

CHARLES P. LYMAN, F. R. C. V. S., Dean,

Graduates of this School are eligible for membership in the United States Veterinary Medical Association.

2.04 ❁ CLOVERDELL STOCK FARM ❁ 2.05½

COLMAR, MONTGOMERY CO., PA.

The World's Champion Campaigner and Money Winner, and Sire of Money Winners.

Director, 1989, 2.17 ❁ Private Stallion.

The Sire of Directum, 2.05 1-4.

DIRECTOR, sire of Direct, 2.05½; Evangeline (4), 2.11¾; Margaret S. (4), 2.12½; Guide, 2.16¼ Waldstein (3), 2.22½, and others in the 2.30 list.

Sire DICTATOR, 113; sire Jay Eye See, 2.10; Phallas, 2.13¾; Director, 2.17, and thirty-three others in the 2.30 list; also sire of the dam of Nancy Hanks, 2.04.

Dam DOLLY, dam of Director, 2.17; Czarina, 2.21; Thorndale, 2.22¼; Onward, 2.25¼, Winona, dam of Pretender, sire of six in the 2.30 list.

GENERAL WORTH 17566, own brother to Sunol, 2.08¼. Dark Bay Stallion, 16 hands high, foaled 1890. Sire ELECTIONEER, 125, dam Waxy, dam of Sunol, 2.08¼; 2d dam Waxana, by Lexington (thoroughbred). **SERVICE FEE, $100.** Limited to 15 approved mares. Usual return privilege.

ALBERT H. 12024, dark bay stallion, 15¼ hands high, foaled 1888. Sire Red Wilkes, 1749, the greatest son of George Wilkes, and sire of eighty-two performers in the 2.20 list. Dam ALCEMAI, own sister to Hallie B., 2.26¾, by Alcyone, 732, sire of McKinney, 2.12½; Alcryon, 2.15, etc.: 2d dam Eleanora, by American Clay, 34, the great sire of broodmares; 3d dam Ellen, by Almont 33. **SERVICE FEE, $100.** Only approved mares accepted, and usual return privilege.

CLOVERDELL STOCK FARM is easily reached from all points, and is 23 miles from Philadelphia, on the Philadelphia and Reading Railroad. Low freight rates and no delays. Season ends September 1, 1894.

FOR SALE.—Single Carriage Horses and Teams, Ladies' and Gentlemen's Saddlers, selected personally by Mr. A. H. Moore, constantly on hand. Registered Jersey Cattle, English Setters and Rough-Coated St. Bernard Dogs.

Catalogue mailed on application after June, 1894. All correspondence in reference to breeding must be addressed to

A. H. MOORE, Proprietor,

1711 Spring Garden Street, Philadelphia, Pa.

GEORGE W. SAUNDERS, Superintendent.

Chicago Veterinary College,

Founded 1883.

Trustees, { R. J. WITHERS, President.
A. H. BAKER, Treasurer.
JOSEPH HUGHES, Secretary.

Regular session commences the first week in October in each year.

For prospectus giving all information as to curriculum, fees, etc., address the

SECRETARY, **JOSEPH HUGHES, M. R. C. V. S.,**

2537 and 2539 State Street, Chicago.

SMITH, KLINE & FRENCH CO.,

Wholesale Druggists

....and....

Manufacturing Pharmacists,

429-435 ARCH ST., PHILADELPHIA, PA.

LARGEST DISTRIBUTERS IN THIS MARKET.

University of Pennsylvania,

DEPARTMENT OF MEDICINE.

THE 130th ANNUAL SESSION will begin Tuesday, October 1, 1895, at 12 a. m., and will end at commencement, the second Thursday in June, 1896.

The Curriculum is graded, and attendance upon four annual Sessions is required. College *graduates* in Arts or Science, who have pursued certain Biological studies, are admitted to advance standing.

Practical Instruction, including Laboratory Work in Chemistry, Histology, Osteology, and Pathology, with Bedside Instruction, in Medicine, Surgery, Gynæcology, and Obstetrics, are a part of the regular course, and without additional expense.

For catalogue and announcement, containing particulars, apply to

DR. JOHN MARSHALL, DEAN,
36th Street and Woodland Avenue, Philadelphia.

UNIVERSITY OF PENNSYLVANIA.

Department of Dentistry,

36th Street and Woodland Avenue, Philadelphia, Pa.

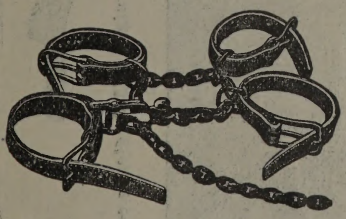
The course of instruction is graded and extends over three years, with one session beginning first o October and ending early in June in each year.

Laboratory instruction of each student, not only in Practical Dentistry but also in Practical Chemistry and Histology, forms a prominent feature in this Department.

The appointments of the Lecture-Rooms, Operating-Room, and Laboratories, are as complete as any in America. For Catalogue address

JAMES TRUMAN, D. D. S., Dean,
3243 Chestnut Street, Philadelphia, Pa.

Veterinary Instruments of Superior Quality



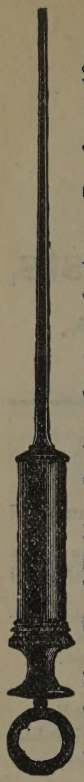
Patent Hobbles.

JOHN REYNDERS & CO.,

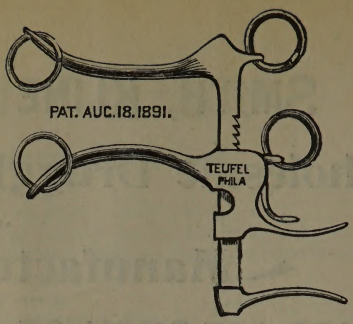
303 FOURTH AVE.,

...NEW YORK.

New Catalogue free on mentioning this Journal.



One-half oz. Hard Rubber Syringe, long nozzle, $1.00; Per dozen, $8.50.



Edward's Speculum with Bridle, $6.00.

Jacob J. Teufel & Bro.,

...Manufacturers of...

VETERINARY, SURGICAL
AND DENTAL

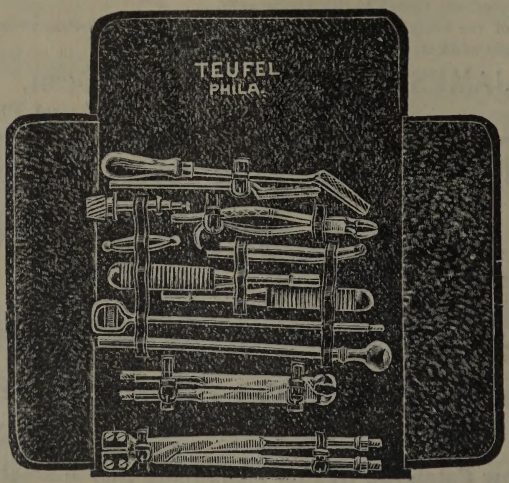
...INSTRUMENTS...

No. 114 South Tenth Street,
Philadelphia.

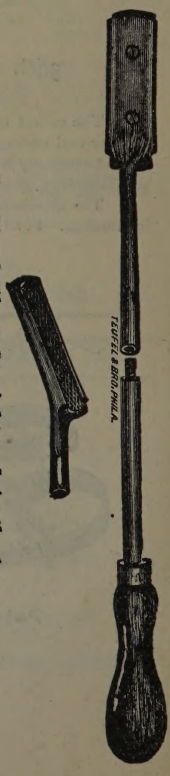
ESTABLISHED 1856.

One oz. Hard Rubber Syringe, short nozzle, 60 cents; Per doz., $6.25.

Curved Float, $2.00.



Dental Set No. 1, $45.00.



Combined Float, Straight and Angle, $3.00.

Hallanan Vulcanized Rubber Horse Shoe Pads.

Patented June 23d, 1891; Aug. 22d, 1893.

Is a Rubber Pad Combined with Canvas, and Backed up with the Best Sole Leather.

FIRST—I claim this pad to be superior to any other in the form of horse shoe pad heretofore reproduced in the United States: it being nearly the full size of the horse's foot.

SECOND—I remove the weight or the bearing of the horse from the wall of the foot by placing it evenly upon the sole and frog of the foot.

THIRD—I claim to remove that jar or painful feeling from the horse's foot which is now caused by our present system of shoeing. The weight of the horse resting on the walls of the foot and the shoe most generally elevated on the corks, namely, two heel-corks and a toe-cork.

FOURTH—I claim that the pad, by placing the working power of the horse evenly upon the frog and sole of the foot, will make him last from three (3) to five (5) years longer. The pad will also prevent contraction of the hoof or foot, or the getting of corns; and prevent the separation of the wall of the foot, quarter-cracks and sand-cracks.

FIFTH—I also claim that my pliable rubber pad will cure corns, bruised heels, separation of the wall of the foot, quarter-cracks and sand-cracks. The pad will also protect weak and tender feet, and prevent the picking-up of nails.

SIXTH—I also claim that the pad will prevent slipping on any kind of pavement, whether it be asphalt or macadamized, or on any icy surface. The pad has an even bearing on the ground, and becomes airtight as soon as the horse's foot strikes the ground.

SEVENTH—I claim a horse will stop and start quicker with this kind of pad than with any other now produced.

This pad will last a horse from two to three months, and will preserve the foot and keep it in a healthy condition.

Among those who are now using the pad are the following, to whom we refer with confidence and pleasure:

William K. Vanderbilt, New York.
Robert Bonner, New York.
Frank Work, New York.
W. & J. Sloane, Carpets, 19th Street and Broadway.
Brooklyn Transportation Co. (Ld), Union Avenue.
Dr. Jos. R. Hogdson, President.
Empire Brewery, Beadleston & Woerz, New York.
Ex-Judge Hilton, New York.
Ex-Mayor Edward E. Cooper, New York.
Ex-Mayor Wm. R. Grace, New York.
Lion Brewery, New York.
George Ehret's Brewery, New York.
W. J. Downing, Boarding Stables, Washington, D.C.
General Lloyd S. Brice, New York.
Eastman Beef Packing Co., New York.
Hygeia Water Co., W. 12th Street, New York.
Callanan & Kemp, Wholesale Grocers, 41-43 Vesey St
Geo. C. Flint Co., Furniture, W. 23d Street.
Vincent King & Co, Plaster Mills, Bethune & West.
Douglas & Peterkin Co., Stables, Clymer St., Brooklyn
Singer Manufacturing Co., New York.
E. D. Kimball & Co., Chicago.
Dr. McCoy (of McCoy & Wildman), New York.
James Everard's Brewery, New York.

OUR PADS ARE ALSO APPROVED BY

New York Society for Prevention of Cruelty to Animals.
Philadelphia Society for Prevention of Cruelty to Animals.
Veterinary Medical Association of New York.
Veterinary Department of the University of Pennsylvania.
Dr. Seward Webb, President Wagner Palace Car Co.

M. HALLANAN, *Inventor, Patentee and Manufacturer,*
190 West Fourth Street, N. Y.

University of the State of New York.

American Veterinary College,

Nos. 139 and 141 West 54th Street, New York City.

Incorporated and organized 1875 under the General Laws of the State of New York; Re-incorporated and Re-organized 1888 by Special Act of the Legislature of the State of New York.

The regular course of Lectures commences in October each year. Graded instructions of THREE YEARS requirements. Circular and information can be had on application to

Dr. A. LIAUTARD, V. M.,
Principal and Dean of the Faculty.

The Exterior of the Horse.

By GOUBAUX and BARRIER.

Translated by

SIMON J. J. HARGER, V. M. D.,

Professor of Anatomy and Zootechnics in the Veterinary Department of the University of Pennsylvania.

Complete in one large octavo volume of 916 pages, with 346 illustrations and 34 plates.

Large type, on fine paper, dark binding $6.00.

"Since 1850, there has been nothing in English written on this important subject. This translation of the standard European work therefore fills an important vacancy in our veterinary literature."—*American Veterinary Review*, New York, February, 1892.

FOR SALE BY ALL BOOKSELLERS.

Descriptive Circular Mailed Free to any Address on Application.

J. B. Lippincott Company,

715-717 Market Street, - - - Philadelphia.

LORETIN.

A NEW IODINE COMPOUND AND SUBSTITUTE FOR IODOFORM.

ODORLESS, INNOCUOUS, UN-IRRITATING,

with an

EXCEPTIONAL ANTISEPTIC ACTION.

Write for pamphlet by Dr. Fenzling on its use in Veterinary Medicine,

to **Schulze-Berge & Koechl,**

Sole Licensees, 79 MURRAY ST., NEW YORK.